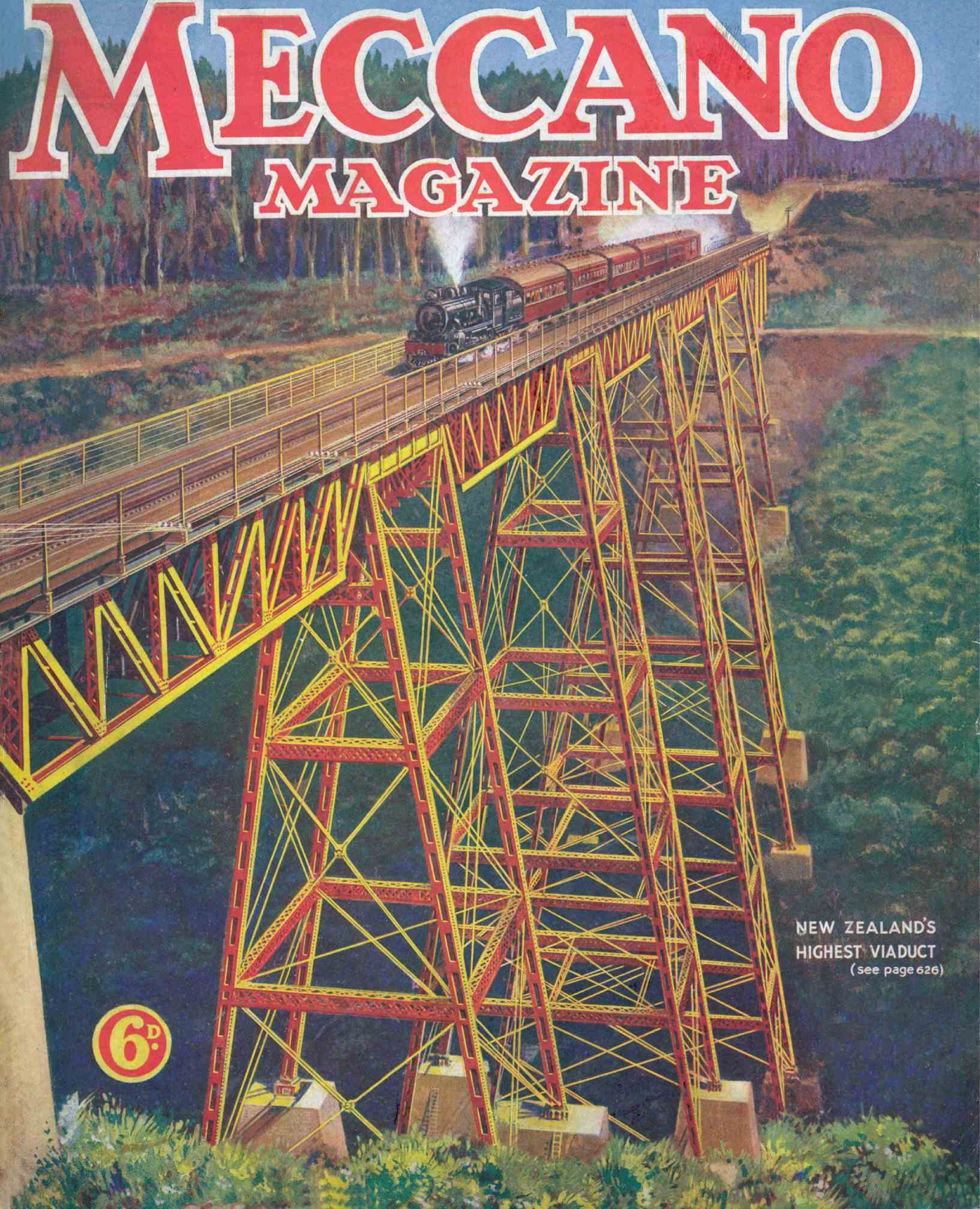
VOL. XX. No. 11
NOVEMBER 1935

MECCANO MAGAZINE

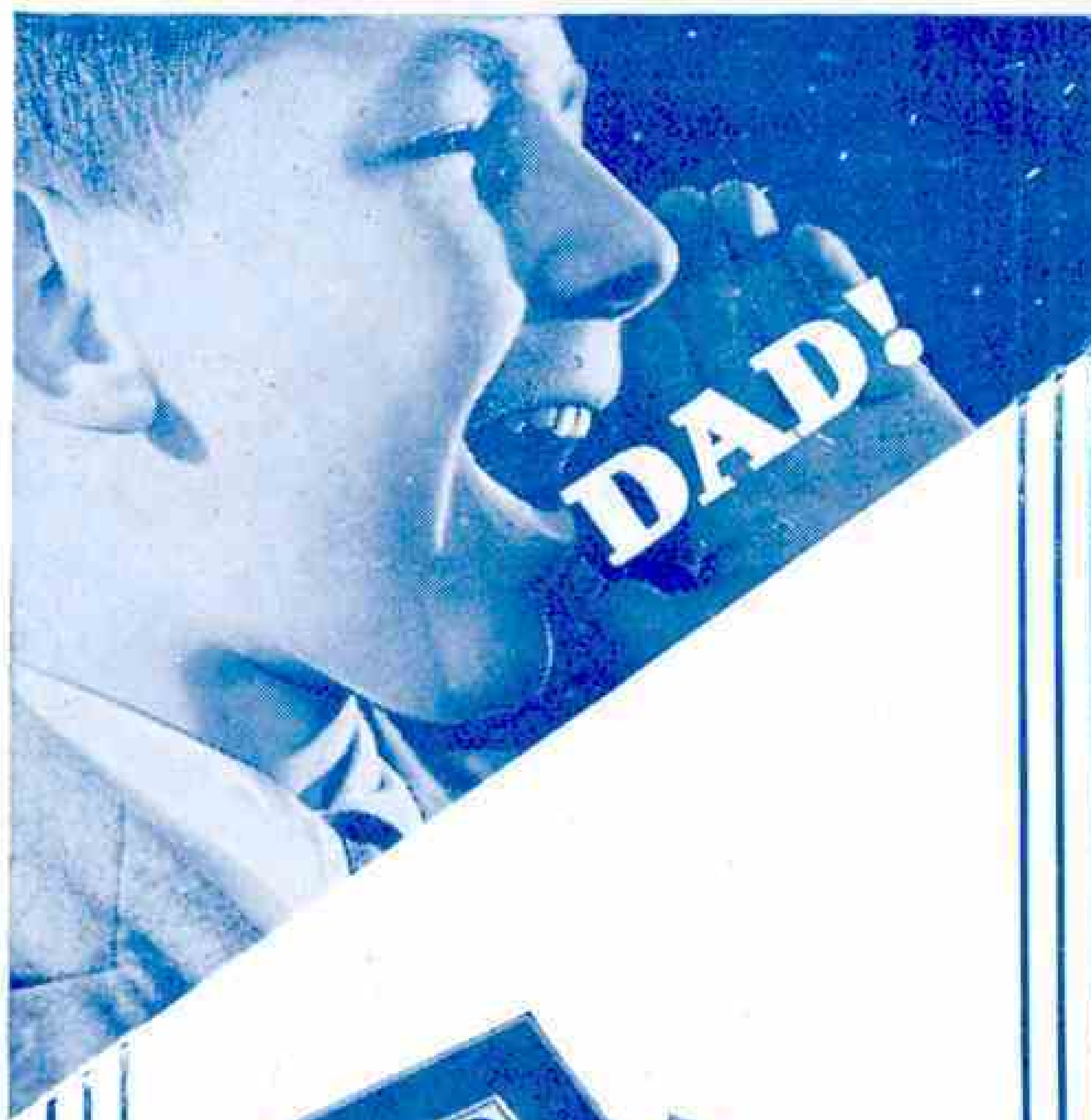


NEW ZEALAND'S
HIGHEST VIADUCT
(see page 626)

6D.

MECCANO

ENGINEERING FOR BOYS



I'm Building a Crane Next—then a Motor Car and an Aeroplane!

Every boy is happiest when he is inventing, creating and building. That is the reason for the everlasting popularity of Meccano. It is the most fascinating hobby in the world, because it enables full scope to be given to all the inclinations and desires that are the natural heritage of boys.

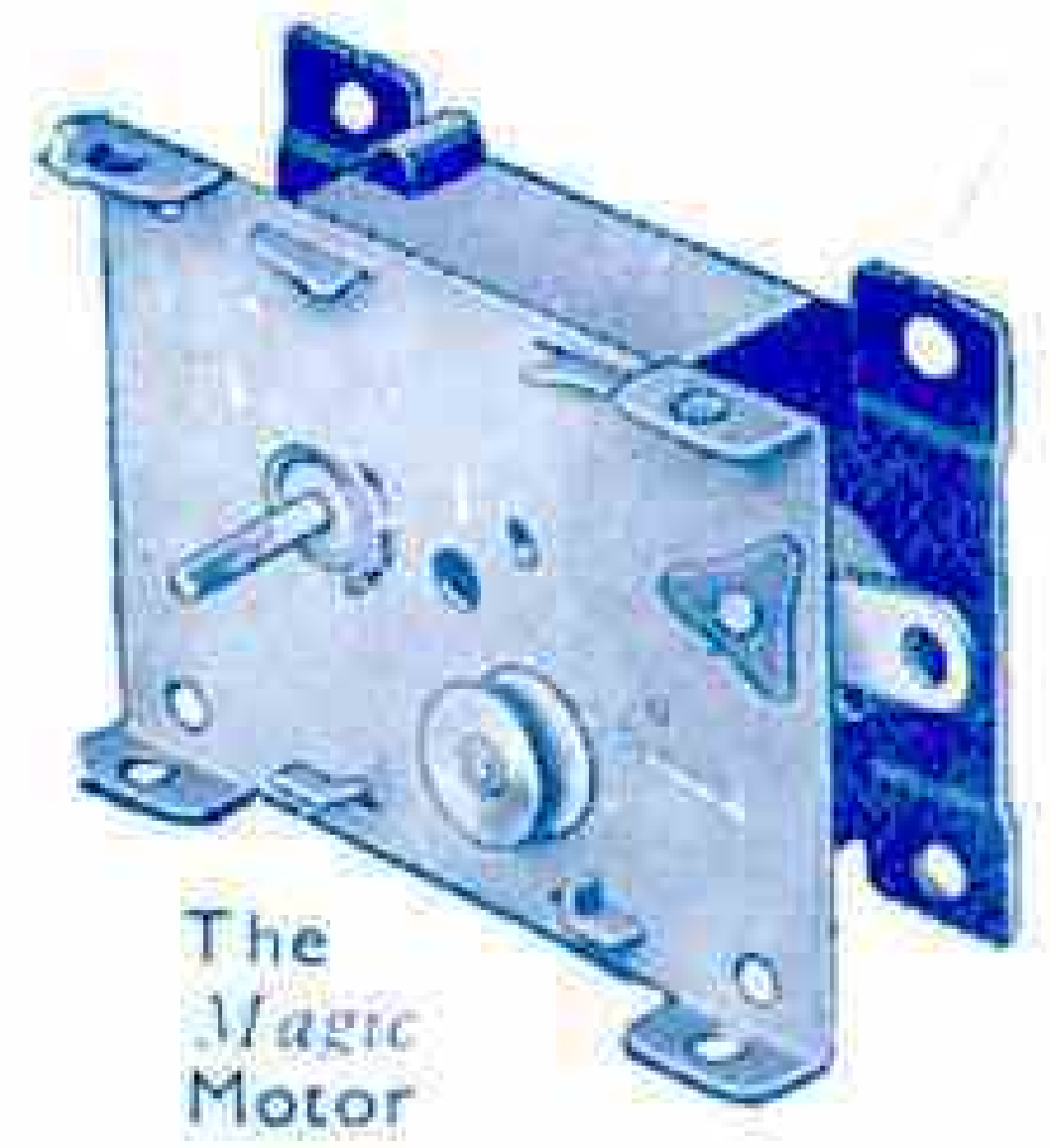
The Meccano system is composed of approximately 350 different parts, each of which serves a definite mechanical purpose. These perfectly finished parts combine to form a complete miniature engineering system with which practically any mechanical movement can be reproduced in model form. More can be accomplished with Meccano than with any other constructional toy, for no other system has such possibilities. The genius is in the parts, and the youngest boy can begin to build Models as soon as he gets his Outfit home.

Run Your Models with a Meccano Motor

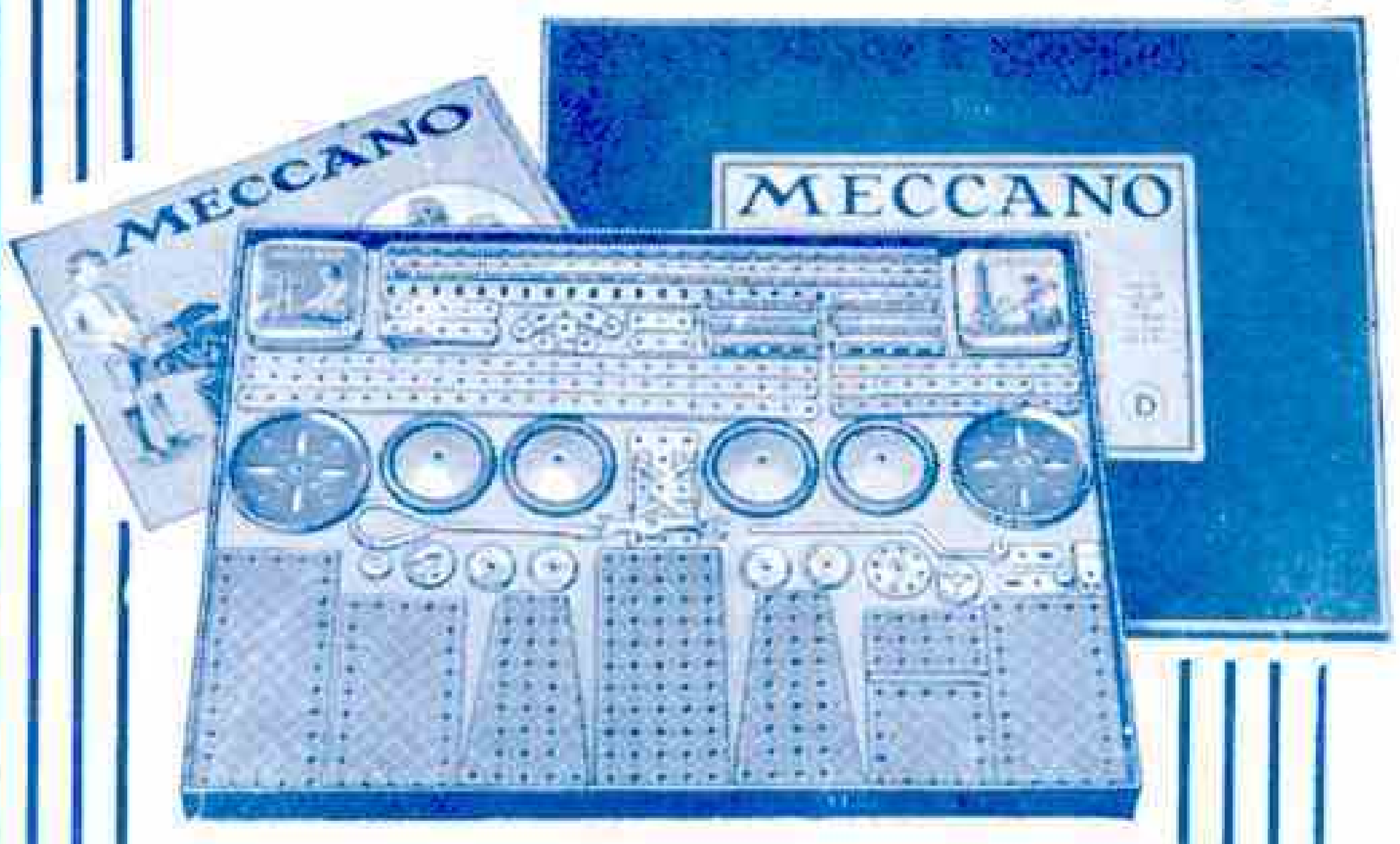
If you want to obtain the fullest enjoyment from the Meccano hobby you must operate your models by means of one of the Meccano Motors. Meccano Clockwork Motors are obtainable at prices ranging from 2/– to 9/– and Meccano Electric Motors from 9/– to 18/6.

THE MECCANO *MAGIC* MOTOR

The Meccano *Magic* Motor is a marvellous clockwork mechanism for driving the smaller models. It is capable of driving all the Meccano A and B Outfits models, and many of the lighter models illustrated in the Manuals for the C, D and E Outfits. It is non-reversing ... ... Price 2/–


The *Magic* Motor

B Meccano Outfit Price 7/6


D Meccano Outfit Price 15/–

H Meccano Outfit Price 72/6

Meccano model-building is the finest hobby in the world.

PRICES OF MECCANO OUTFITS

COMPLETE OUTFITS

A Outfit		... ... each	5/–
B ,,		... ... ,,	7/6
C ,,		... ... ,,	10/–
D ,,		... ... ,,	15/–
E ,,		... ... ,,	20/–
F ,,		... ... ,,	30/–
G ,,		... ... ,,	55/–
H ,,	(Carton)	... ... ,,	72/6
Hw ,,	(Cabinet)	... ... ,,	97/6
K ,,	(Carton)	... ... ,,	132/6
Kw ,,	(Cabinet)	... ... ,,	157/6
L ,,	(,,)	... ... ,,	400/–

ACCESSORY OUTFITS

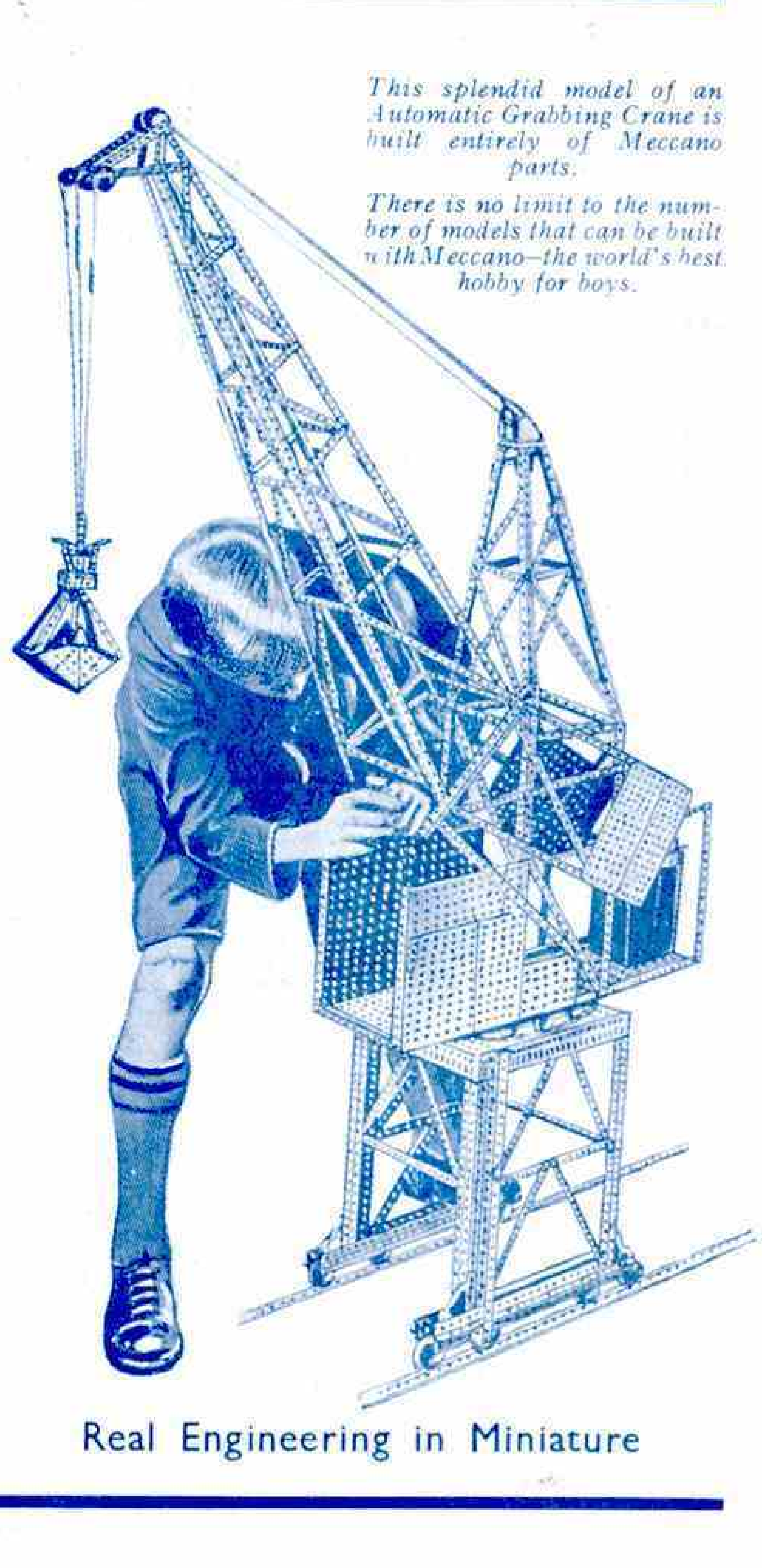
The purpose of Meccano Accessory Outfits is to connect the main Outfits from A to L. They are best described as the stepping stones to bigger and better models. Thus a B Outfit can be converted into a C by adding to it a Ba Accessory Outfit, and a Ca would then convert it into a D. No matter how small the Outfit you commence with, you may build it up by degrees until you possess all the parts contained in the largest Outfit.

Aa	converts	A Outfit into	B	... each	2/6
Ba	,,	B ,, ,,	C	... ,,	3/–
Ca	,,	C ,, ,,	D	... ,,	5/6
Da	,,	D ,, ,,	E	... ,,	5/6
Ea	,,	E ,, ,,	F	... ,,	11/–
Fa	,,	F ,, ,,	G	... ,,	26/6
Ga	,,	G ,, ,,	H	... ,,	17/6
Ha	,,	H ,, ,,	K	... ,,	60/–
Ka	,,	K ,, ,,	L	... ,,	225/–

MECCANO LTD.
BINNS ROAD
LIVERPOOL 13

This splendid model of an Automatic Grabbing Crane is built entirely of Meccano parts.

There is no limit to the number of models that can be built with Meccano—the world's best hobby for boys.


Real Engineering in Miniature

Hamleys News

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200-202, REGENT STREET, LONDON, W.1 **OUR ONLY ADDRESS**

Number Thirty-one *November, 1935*

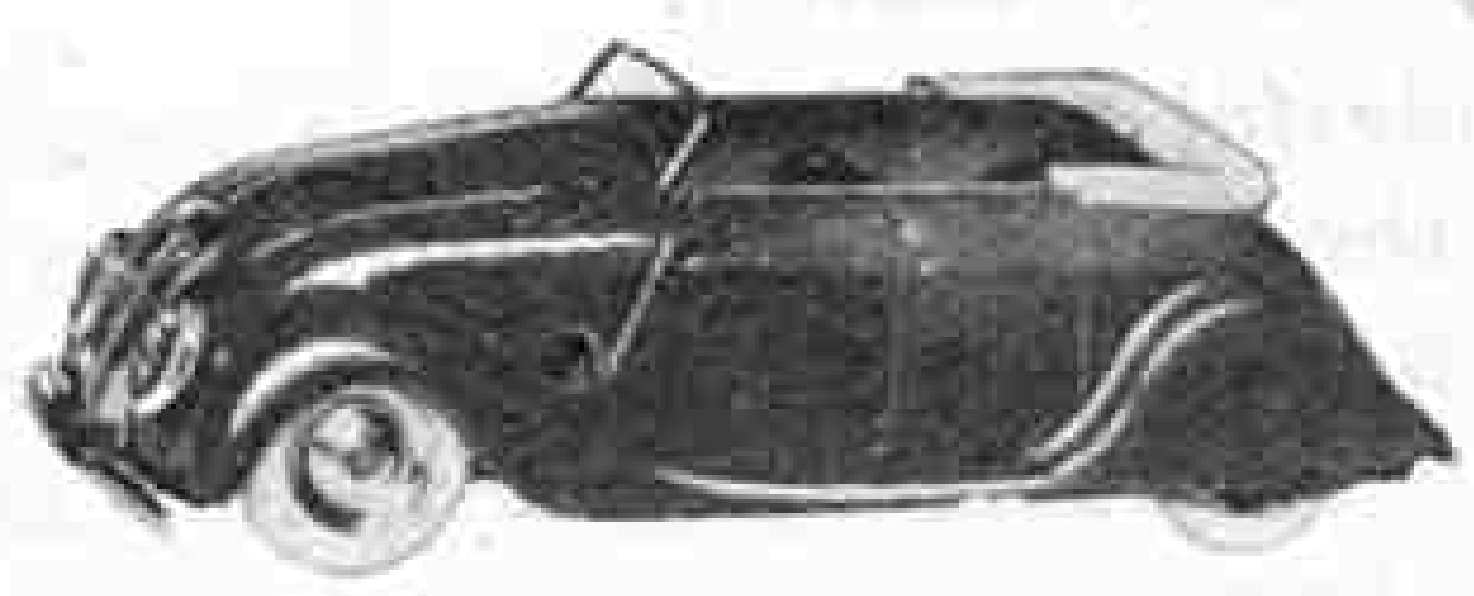
AN EXCITING PAGE OF NEW IDEAS

MINIC COVERED VAN
Strong construction and powerful long-running clockwork motor. Enclosed driving cabin. Length 5½ ins. Price **1**/-. Post 3d.

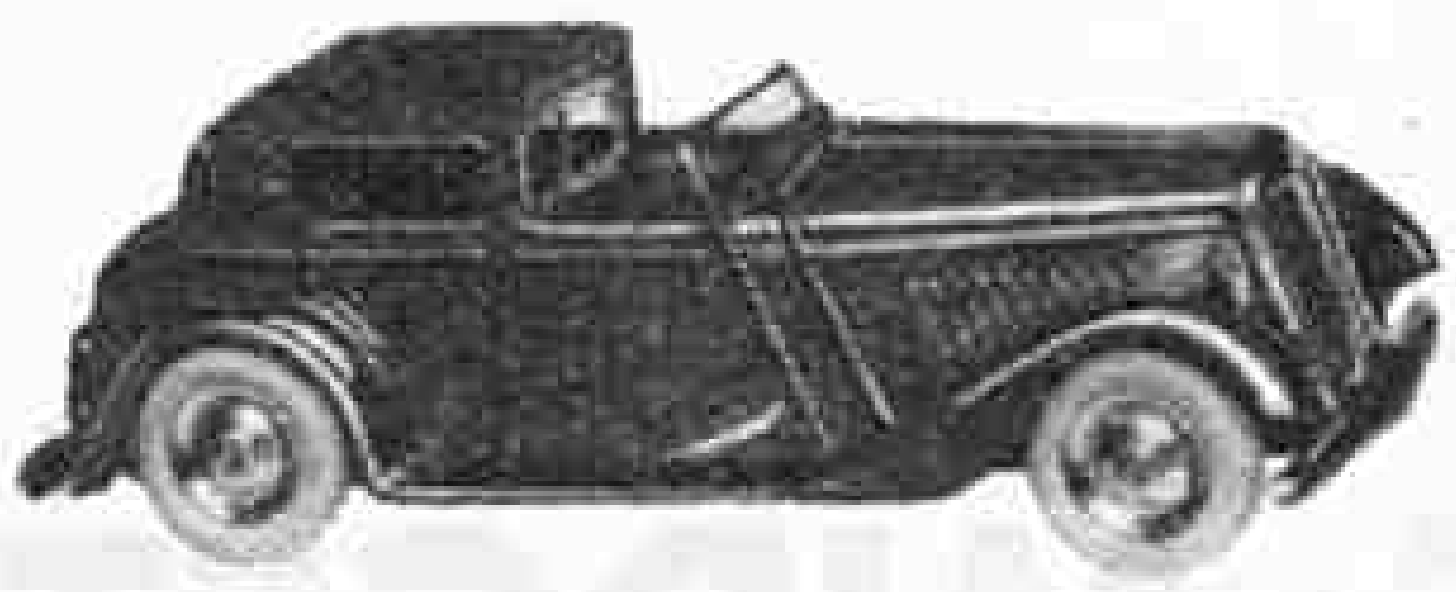
WORKING MODEL ELECTRIC LIGHTHOUSE
With ingenious flashing switch. A very attractive accessory for your navy and merchant fleet. Price **3/6** Post 4d.
Height 5½ ins.

MINIC OPEN LORRY
With front wheel drive and closed driving cabin. Will carry small loads. Length 5 ins. Price **1**/-. Post 3d.

MINIC SPORTS SALOON
With plated mudguards, radiator, bumpers and rubber tyred wheels. Length 4¾ ins. Price **1**/-. Post 3d.



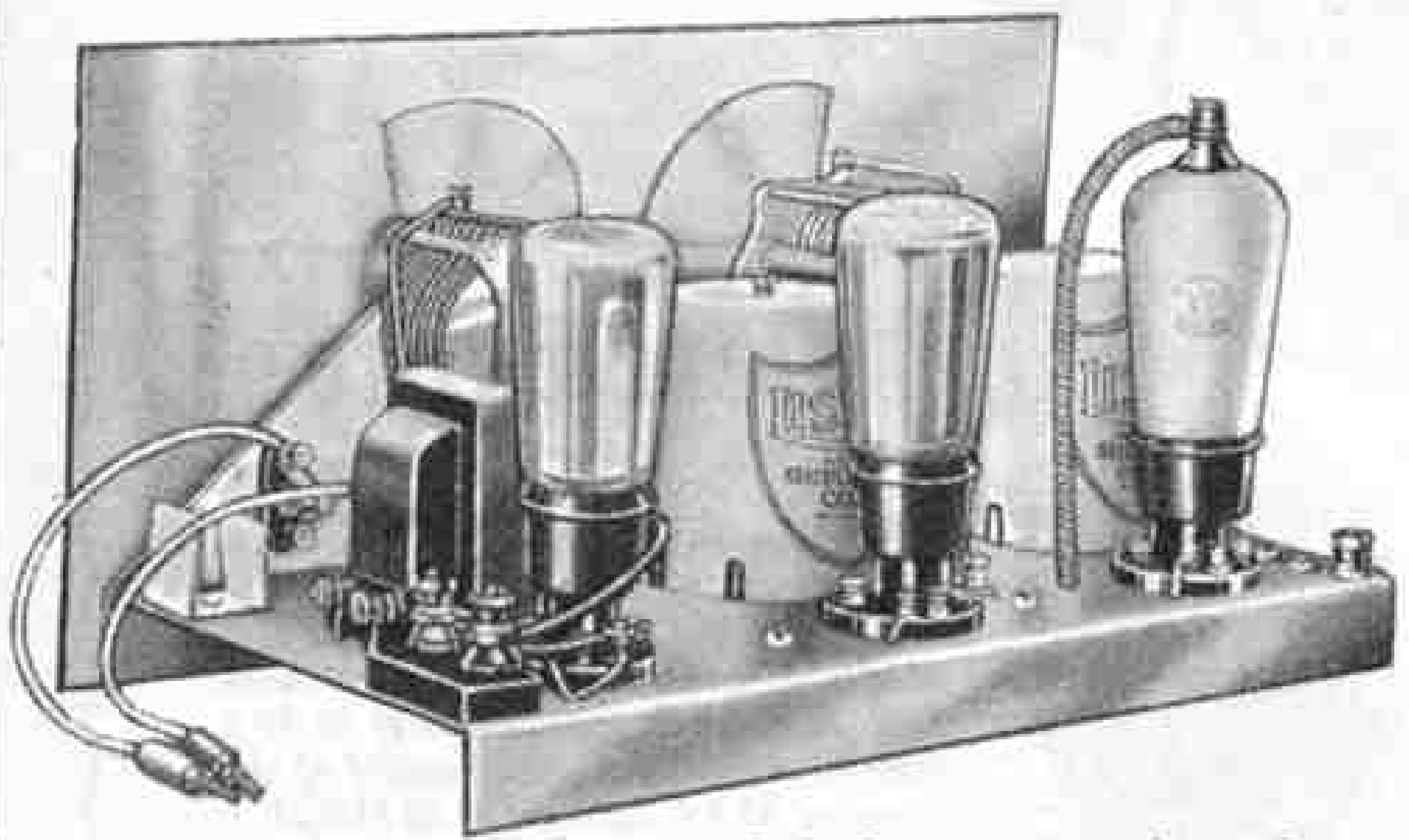
MINIC SCALE MODEL STREAMLINE OPEN CAR
Long-running clockwork mechanism. Every detail in construction. Length 5 ins. Price **1**/-. Post 3d.



MINIC CABRIOLET
An exact replica of this model. With plated radiator, dummy lamps on bumpers. Length 4¾ ins. Price **1**/-. Post 3d.

MINIC SPORTS TOURER
Colours: green or red. Ivory mudguards and hood. Plated bumpers, radiator and wheels, with rubber tyres. Length 4¾ ins. Price **1**/-. Post 3d.

FLOODLIGHTING SET
Now you can see your toys floodlit, brilliant colour effects from a 4-volt battery, suitable for Forts, Farms, Railways, Rockeries. As illustrated, five floodlights assorted colours, three spare discs, bulbs, wire, switch, etc. Price **7/6** Post 6d.
Smaller size: three floodlights. Price **5**/-. Post 6d.
Smallest size: two floodlights. Price **3/6**. Post 6d.



Lissen Short Wave "3" Constructional Radio Set
Build your own set by means of this fine constructional kit. It includes everything necessary, valves, batteries, etc., and is complete with a very simple construction chart. Boys will find a great delight in building this set and obtaining immediate results. Price **£3/9/6** Post Free.

With this new floodlighting set, you can light up your Meccano models most effectively, and the Minic cars are a line we are sure you like. They are the first to be all to scale, so that the bus is the right amount larger than the coupé, etc. The two constructional sets speak for themselves.

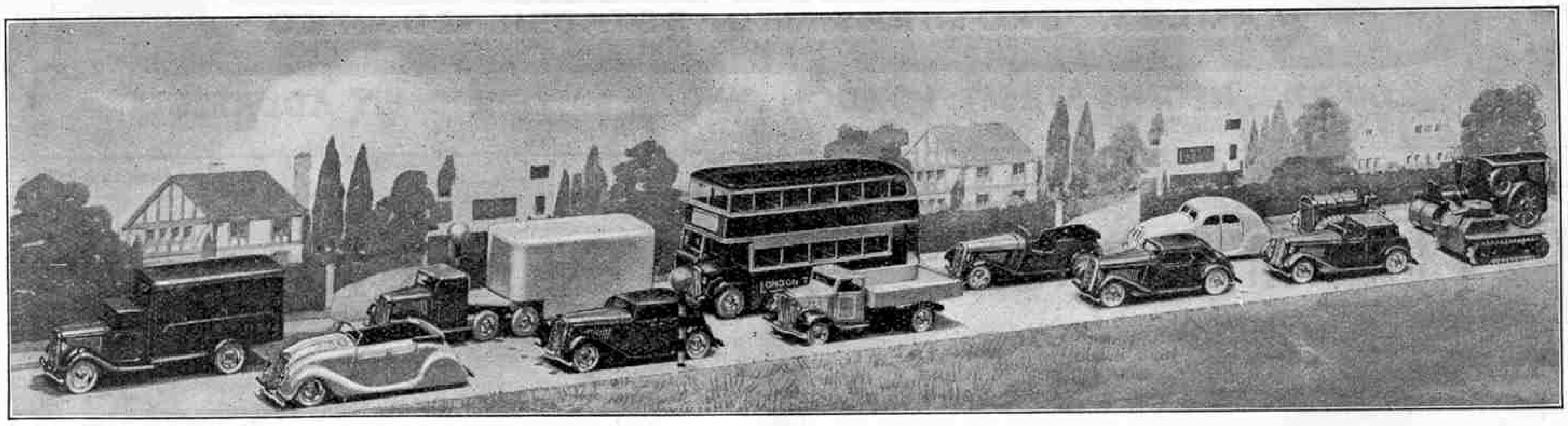
Write now for our new Christmas Catalogue. A wonderful catalogue of games, toys and all sports. 80 pages with large colour supplement. POST FREE.

THE MILES "HAWK-MAJOR"
Wing span 16½ ins. A constructional Flying model of the famous aeroplane record time holder for light aircraft, England, Australia and back. 2nd King's Cup 1934-5. This wonderful kit includes all important parts blanked out, finished air-screw and step-up gear box, aluminium wheels and wind shield. Full working plan and "step-by-step" instruction sheet. Price **10/6** Post 6d.

MINIC

SCALE MODEL CLOCKWORK TOYS

REGD. TRADE MARK



Above is an actual photograph of MINIC Scale Model Clockwork Toys on a model roadway.

This wonderful series contains almost every type of vehicle seen on the roads. Fitted with powerful front wheel drive mechanism, they will run anywhere—even on the carpet. Each model can be obtained in a variety of colours, packed in a handsome box.

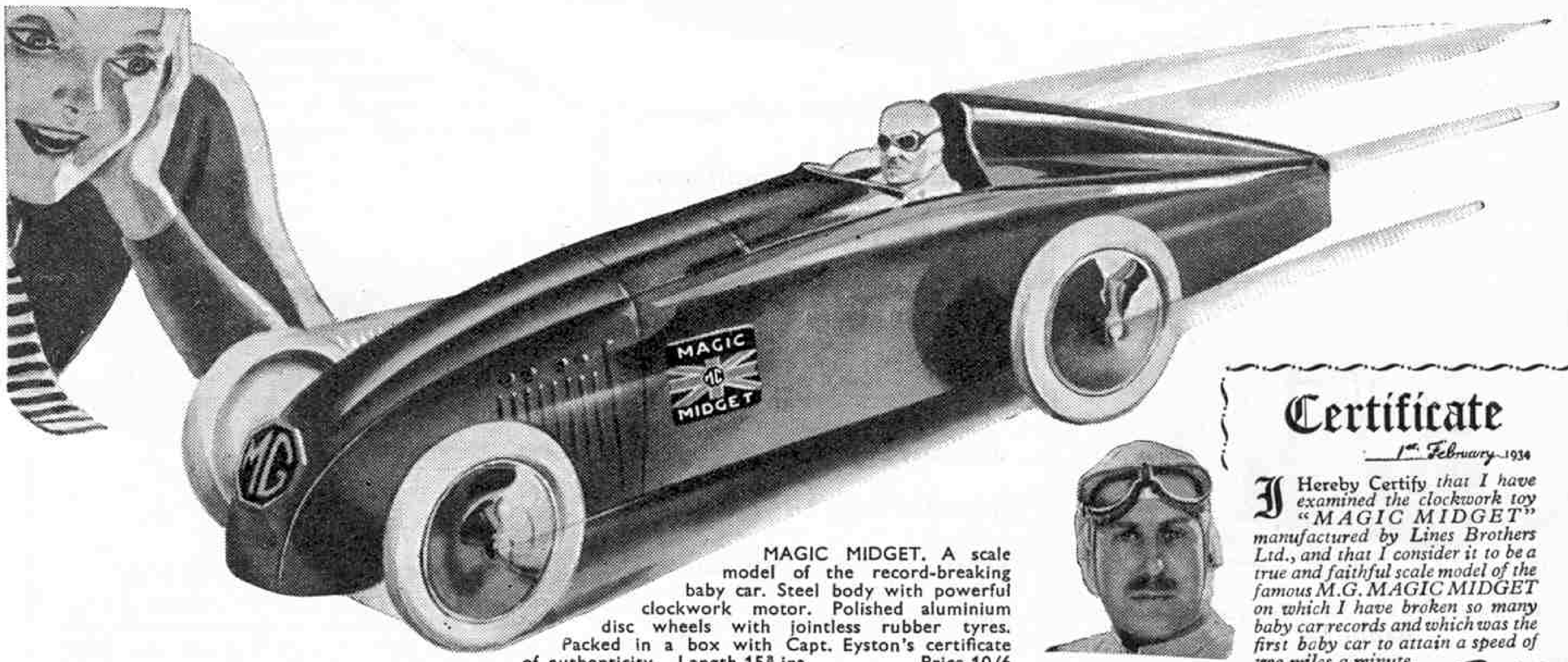
Ask your dealer to show you the MINIC range, and start your collection NOW.

THE SERIES INCLUDES:

SPORTS SALOON	Length 4¾"	...	1/-
LIMOUSINE	,, 4¾"	...	1/-
CABRIOLET	,, 4¾"	...	1/-
TOWN COUPE	,, 4¾"	...	1/-
TOURING CAR	,, 4¾"	...	1/-
STREAMLINE SPORTS	,, 5"	...	1/-
STREAMLINE SALOON	,, 5"	...	1/-
DELIVERY VAN	,, 5½"	...	1/-
LORRY	,, 5"	...	1/-
TRACTOR	,, 3"	...	1/-
TANK	,, 3¼"	...	1/6
STEAM ROLLER	,, 5¼"	...	1/6
MECHANICAL HORSE AND PANTECHNICON	,, 7⅝"	...	2/-
BUS	,, 7¼"	...	5/-

BOYS! YOU MUST OWN THIS WONDERFUL SCALE MODEL OF CAPT. EYSTON'S RECORD-BREAKING **M.G. MAGIC MIDGET**

THE FIRST BABY CAR TO DO 120 M.P.H.



MAGIC MIDGET. A scale model of the record-breaking baby car. Steel body with powerful clockwork motor. Polished aluminium disc wheels with jointless rubber tyres. Packed in a box with Capt. Eyston's certificate of authenticity. Length 15¾ ins. Price 10/6

Certificate

1st February 1934

I Hereby Certify *that I have examined the clockwork toy "MAGIC MIDGET" manufactured by Lines Brothers Ltd., and that I consider it to be a true and faithful scale model of the famous M.G. MAGIC MIDGET on which I have broken so many baby car records and which was the first baby car to attain a speed of two miles a minute.*

(Signed) George Eyston

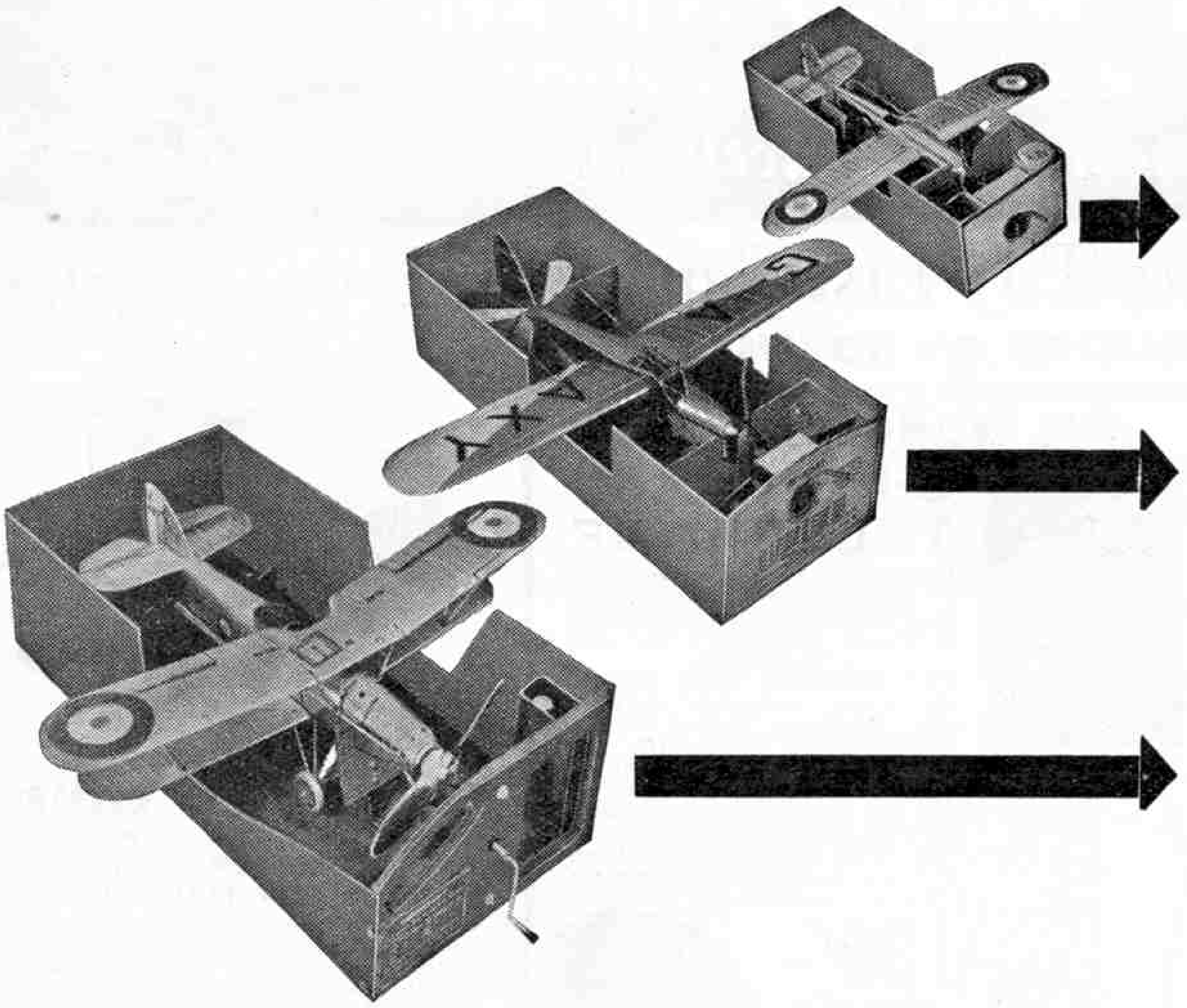
STOCKED BY ALL GOOD TOY SHOPS AND STORES.

MADE BY

LINES BROS. LTD. **TRI-ANG WORKS, LONDON, S.W.19**

GAIN PROMOTION IN THE FROG FLEET

These photographs show the complete range of FROG Scale models and their relative sizes. Each is supplied in the unique FROG patent winder box which eliminates tedious winding and makes it possible to have six flights in the time of one. All FROG models are fitted with quick detachable fittings, which, in the event of a crash, immediately become detached and lessen the possibility of damage. When you have mastered the piloting of one, buy the next one, and the next, until you have a complete Air Force.



LEARN TO FLY ON THIS ONE

FROG INTERCEPTOR FIGHTER Mark IV, the ideal machine with which to start your flying career. It will rise off the ground, and loop, and do all kinds of stunts. Then—

5/-

FOR GREATER FLYING EXPERIENCE

FROG PUSS MOTH MONOPLANE, an exact scale model of the famous de Havilland machine; as you gain experience you can make it fly higher and further than the Interceptor Fighter.

17/6

FOR THE REAL "ACE"

FROG HAWKER HART Mark II, is a magnificent scale model of a high performance bi-plane day bomber. You can make it fly 750 feet at one winding—service ceiling 60 feet. The finest model aeroplane in the World.

42/-

FROG

BRITISH MADE by INTERNATIONAL MODEL AIRCRAFT LIMITED
Sole Concessionaires: LINES BROS. LTD., MORDEN ROAD, S.W.19

"FROG" FLYING CLUB

Owners of the "Frog" model aircraft are eligible for membership of the "Frog" Flying Club. The badge illustrated is obtainable by those members who pass proficiency tests. Price **6d.** each. Send Coupon for particulars.

COUPON To Lines Bros. Ltd., (Dept L), Morden Rd., London, S.W.19
Please send me your "Frog" coloured leaflet with particulars of the "Frog" Flying Club and of how to obtain handsome enamelled Air Force pilot badges.

NAME..

ADDRESS..

Please write in block letters.

THE NAME *Gamages* GUARANTEES THE VALUE

GAMAGES

GIANT CHRISTMAS BAZAAR

The Most Thrilling Show for Boys in Britain **BEGINS NOV. 4TH**

NATIONAL HEADQUARTERS FOR MECCANO, HORNBY TRAINS and SPEED BOATS, TRI-ANG TOYS, WARNEFORD AEROPLANES, CHAD VALLEY TELEPHONES,

and all the Latest Constructional Sets for Boys

72 Page Christmas Toy List Sent FREE on Request

PUBLISHED ON NOVEMBER 15th

Amazing offer of Genuine Ex-Govt.

PERISCOPES

Strong wood cases. Finest quality, plane mirrors. The periscope folds compactly into a strong canvas case with separate pocket containing two spare mirrors. Ideal for Boy Scouts and all outdoor youngsters. Must have originally cost ten times this price. Gamages Price complete with Canvas Case **2/6** Post 9d.

MICROPHONES

A special purchase enables us to offer these microphones at this absurd price. Made to sell at 10/- each. A transformer is fitted in the base, making it very simple to operate. You simply connect the front terminals on the microphone to Pick-Up terminals on your Radio Set and the back terminals on the microphone to an ordinary 2-4 volt battery. Complete with instructions. Battery 4d. extra. **3/11** Post 6d.

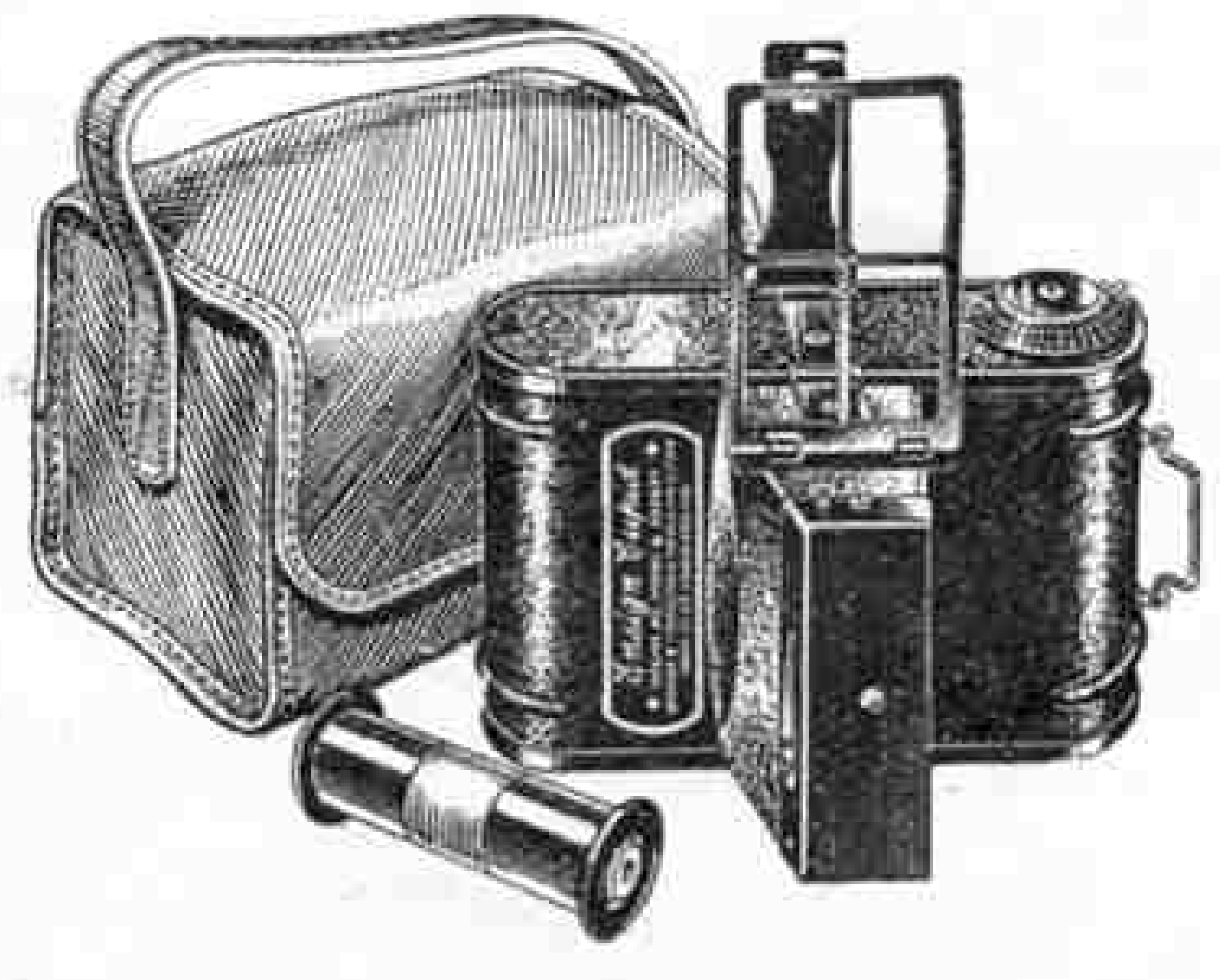
THE WONDERFUL, NEW CHAD VALLEY TELEPHONE

Not so much a toy as a practical instrument for home use. Manufactured side by side with the Post Office telephones, and tested under rigid conditions.

THE BAKELITE BASE. Built on the modern "streamline" design in either Black or Figured Walnut. **AUTOMATIC CALLING DEVICE.** All you do is to lift the receiver. Instantly the buzzer on the distant instrument begins to sound, and continues to do so until your call is answered. No current is being taken from the battery when receivers are replaced. Single 3-Volt Battery operation. Anyone from the youngest schoolboy can install this new Telephone.

COMPLETE SET OF 2 'PHONES AND 40 ft. OF WIRE. 30/- Battery 4d. ex.

ENSIGN 'CUPID' CAMERA



Originally Listed alone at 21/-, now with WATERPROOF CASE AND ROLL OF FILM FOR FIVE SHILLINGS!

This beautifully constructed little camera is fitted with rapid lens, special T. & I. Shutter with safety catch, and latest type collapsible direct vision view-finder. Particularly economical to use, as it takes 16 pictures on a standard 8 exposure $2\frac{1}{4} \times 3\frac{1}{4}$ spool (1/-). **Complete Outfit 5/-** Post 6d.

TWO-WAY SIGNAL (6 LIGHTS)

This very attractive and realistic signal is controlled by a switch at the rear, and is just what you want for your model railway. An ordinary 4-volt fountain type battery is used. Colours are red, green, and amber, and any two light together. Exceptional value. **4/-** Post 4d

DELIVERED ON FIRST OF 6 MONTHLY PAYMENTS OF 9/-

THE GAMAGE 5-FT. SUPER BILLIARD TABLE

Produced exclusively for Gamages, and Britain's best value. Laminated bed of superior quality, scientifically battened to obviate warping. Covered with good quality billiard cloth. Heavy pattern continuous cushion rails, made of hardwood. Highly polished. Oak or Mahogany finish. Fitted with four adjustable feet for levelling. Each table is complete with the following: **Set of $1\frac{1}{2}$ inch turned composition billiard balls. 2 4-ft. cues. Superior marking board with brass slides. Chalk, and booklet of rules. 49/6**

SMALLER SIZES:

Size of table	Length of cues	Diam. of balls	
4 ft.	3 ft. 6 in.	$1\frac{3}{8}$ in.	**35/-**
*3 ft. 6 in.	3 ft.	$1\frac{1}{4}$ in.	**23/6**
*3 ft.	3 ft.	$1\frac{1}{8}$ in.	**19/6**

**The last two tables have slightly cheaper quality cloth.*

SNOOKER SET.—17 balls and triangle, suitable for 5 ft. table **20/-**

Carr. Paid to nearest Railway Station England & Wales. **Book of Official Rules of Snooker...1/-**

GAMAGES, HOLBORN, LONDON, E.C.I. *Telephone: Holborn 8484.* *City Branch: 107, Cheapside, E.C.2.*

If you ask for Toffee

you wouldn't expect Nougat

And if you asked for Seccotine and got something else would you take it quietly? Not likely! No other adhesive has **half** the strength of Seccotine, and that's not guesswork. Laboratory tests prove Seccotine is **twice as strong.** You don't want to do things by halves. When you stick your models, carpentry and repairs you want them **stuck,** not half-stuck. So make jolly sure you get **real** Seccotine, with the name on the tube, the adhesive that has stuck for fifty years far better than all others.

Obtainable in tubes, **4½d., 6d., and 9d.,** from all good Stationers, Ironmongers and General Stores. MADE BY BRITISH WORKPEOPLE.

SECCOTINE RECD.

THE DOUBLE STRENGTH ADHESIVE

STICKS EVERYTHING

POST THIS COUPON to: Dept. M.

M'Caw, Stevenson & Orr Ltd., Belfast.

I should like to have, post free, a copy of your Free Booklet.

NAME ....

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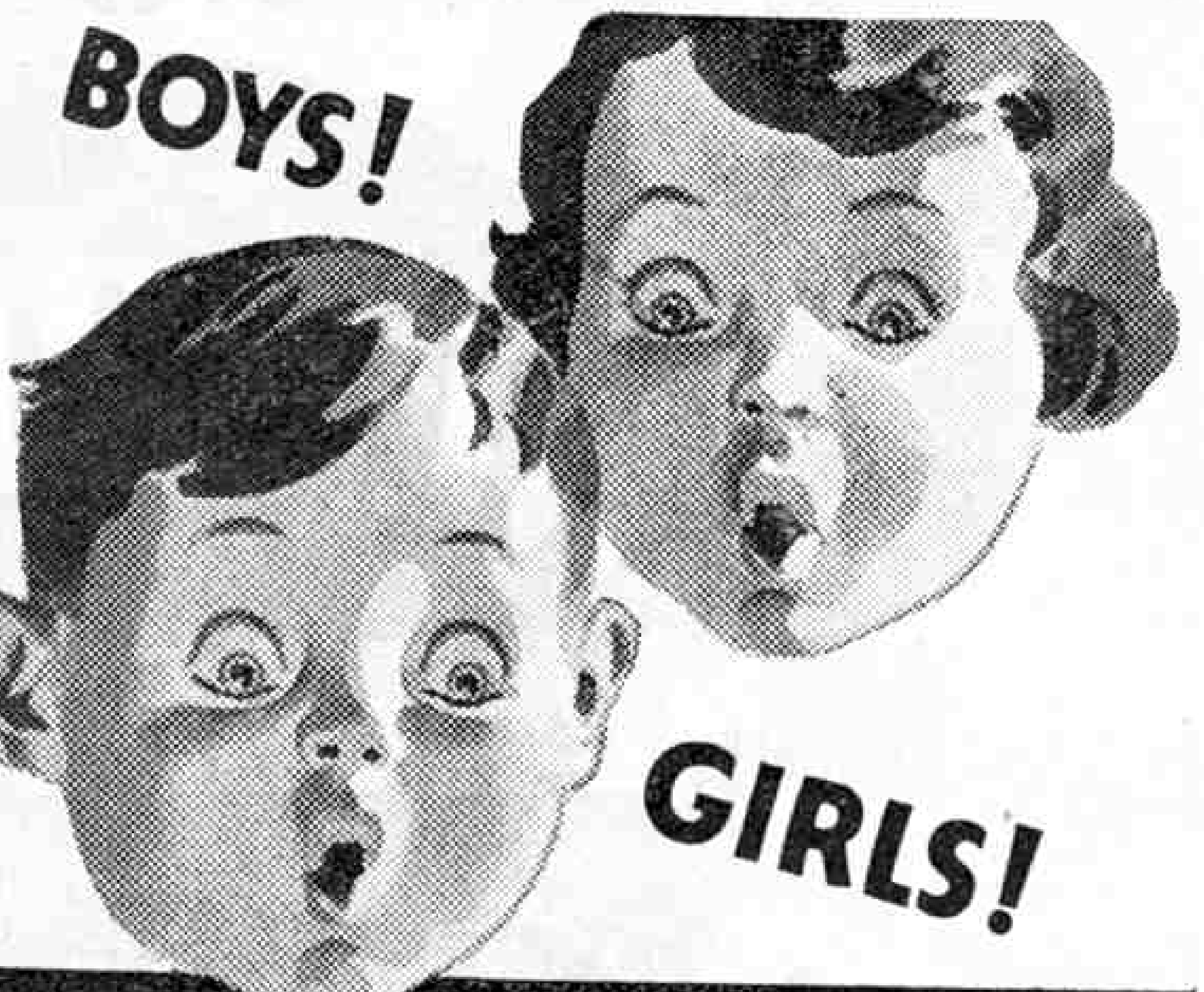
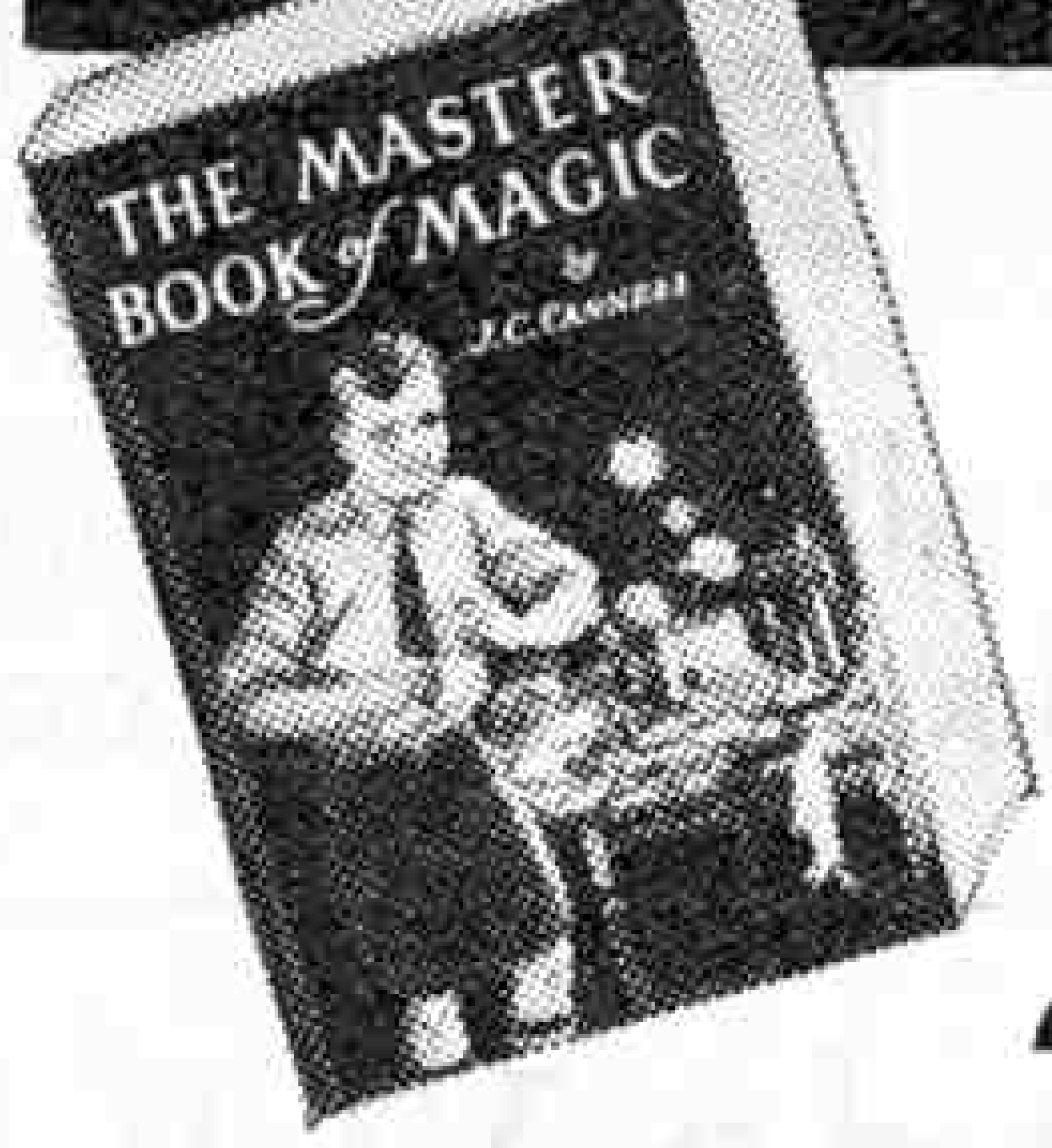


. . . SECRETS OF A GREAT MAGICIAN'S HAIR RAISING FEATS! Revealed by a Vice President of the Magicians Club!



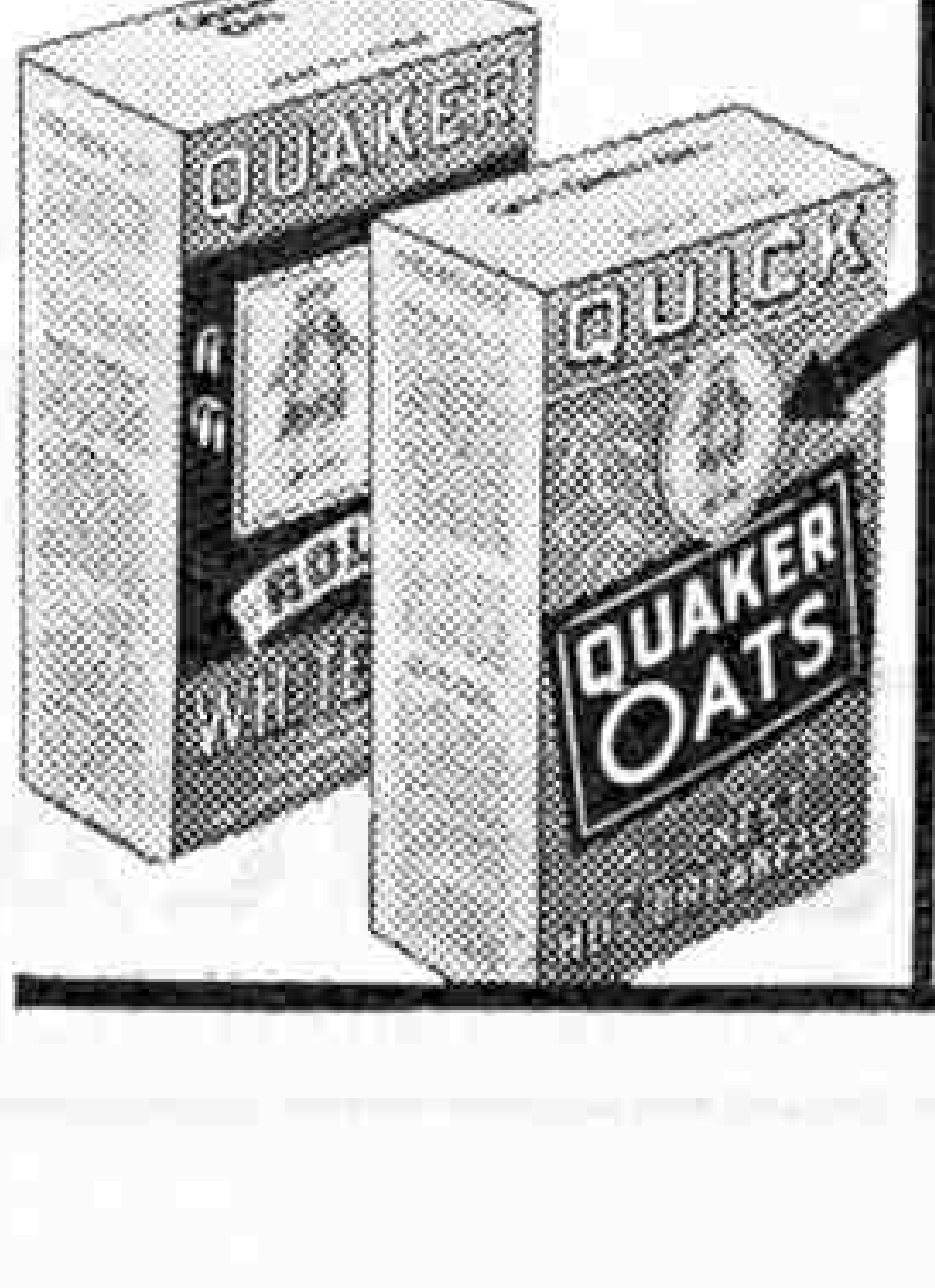
In addition, over 35 tricks, simple to perform, yet baffling, mystifying, are contained in this splendid 64-page book—

THE MASTER BOOK OF MAGIC— AND IT'S

-*Free!*

FOR THE QUAKER FIGURES CUT FROM THE FRONT OF TWO PACKETS OF QUAKER OATS (or QUICK QUAKER)

Here's about the most exciting book you ever read — *going for nothing!* Houdini—the mystery magician man, the greatest conjurer who ever lived, electrified the world with the most fantastic tricks imaginable. *His most hair-raising feats are now fully exposed and explained in this very book!* How he walked through *a brick* wall; was buried alive and lived; escaped from a riveted sealed milk can full of milk, and other hair-raising feats. And that's not all—this book, containing 64 pages, will show you just how to be *an expert conjurer yourself* in a very short time—its author, Mr. J. C. Cannell, was for ten years Vice-President of the Magicians Club. There are over 35 tricks fully described and illustrated —simple for you to perform. You'll have endless fun surprising and mystifying the family and your friends. And you get it, by return, simply by sending the Quaker figures cut from the front of two packets of Quaker Oats (or Quick Quaker), (the most deliciously *creamy* porridge you ever tasted). Ask Mother for the packets to day!



CUT OUT AND POST THIS COUPON *To-day!*

To Dept. M.M.1. Quaker Oats Ltd., 11 & 12 Finsbury Square, London, E.C.2.

I enclose the Quaker figures cut from the front of two packets of Quaker Oats (or Quick Quaker). Please send me my free copy of the MASTER BOOK OF MAGIC.

WRITE IN CAPITAL LETTERS

NAME ....

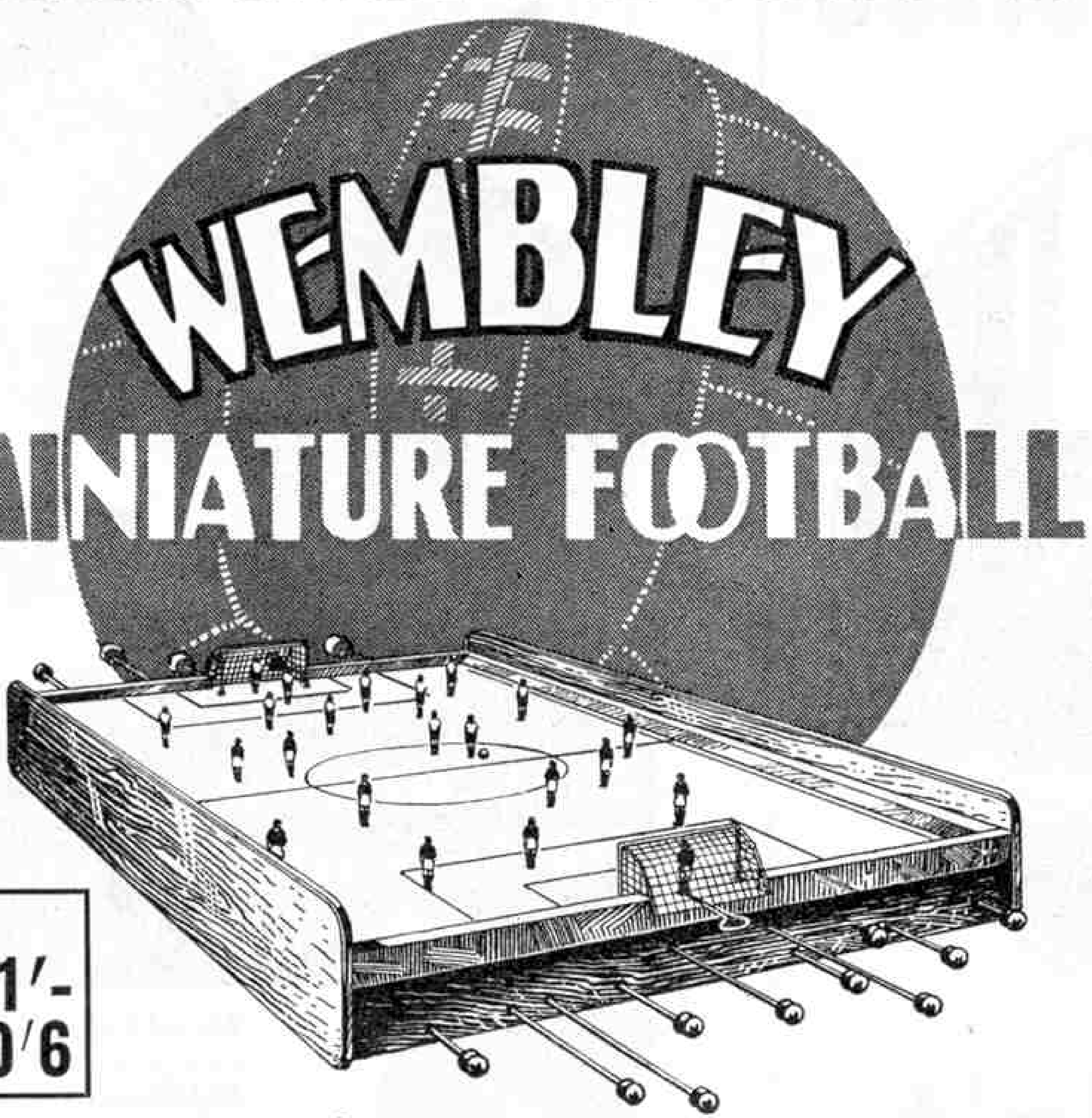
ADDRESS ....

....

Post in 1½d. stamped, sealed envelope.

Offer applies in Great Britain and Northern Ireland only.

● SENSATIONAL NEW TABLE GAME



IDEAL FOR LONG EVENINGS AT HOME OR IN THE CLUB.

IT'S EXCITING, SKILFUL, PACKED WITH FAST FUN.

and say!—
just watch it draw a crowd!

FULL TEAMS OF COLOURED METAL MEN—EACH UNDER CONTROL.

MODELS
STANDARD 21/-
JUNIOR 10/6

from all Stores and Large Sports Dealers

Trade enquiries: BERWICK'S TOY CO. LTD., la, South Hunter Street, LIVERPOOL

What do *YOU* want for XMAS?

See these fine ASTRA Electrical Toys
in every good store throughout Britain

TRAFFIC LIGHT

Two-light Railway or Traffic Signal. Height 6¾". Complete with standard battery housed in stem and switch controlling red and green lights. Black finish. Price **2/11**

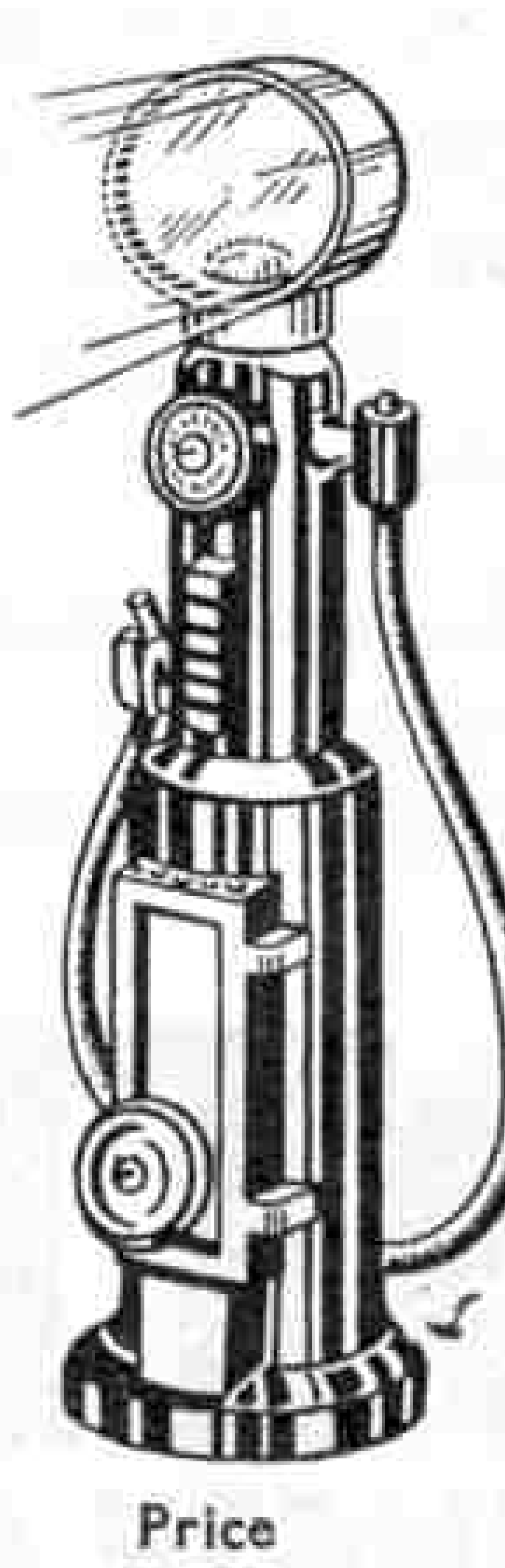
SEARCHLIGHTS

This model is 5" high, throws a powerful beam of light adjustable through any angle. Complete with switch, bulb and battery housed in case finished battleship grey.

Price **3/11**

Mounted on circular platform, a realistic model throwing a very powerful beam for a considerable distance.

Price **5/6**



TRAFFIC LIGHT

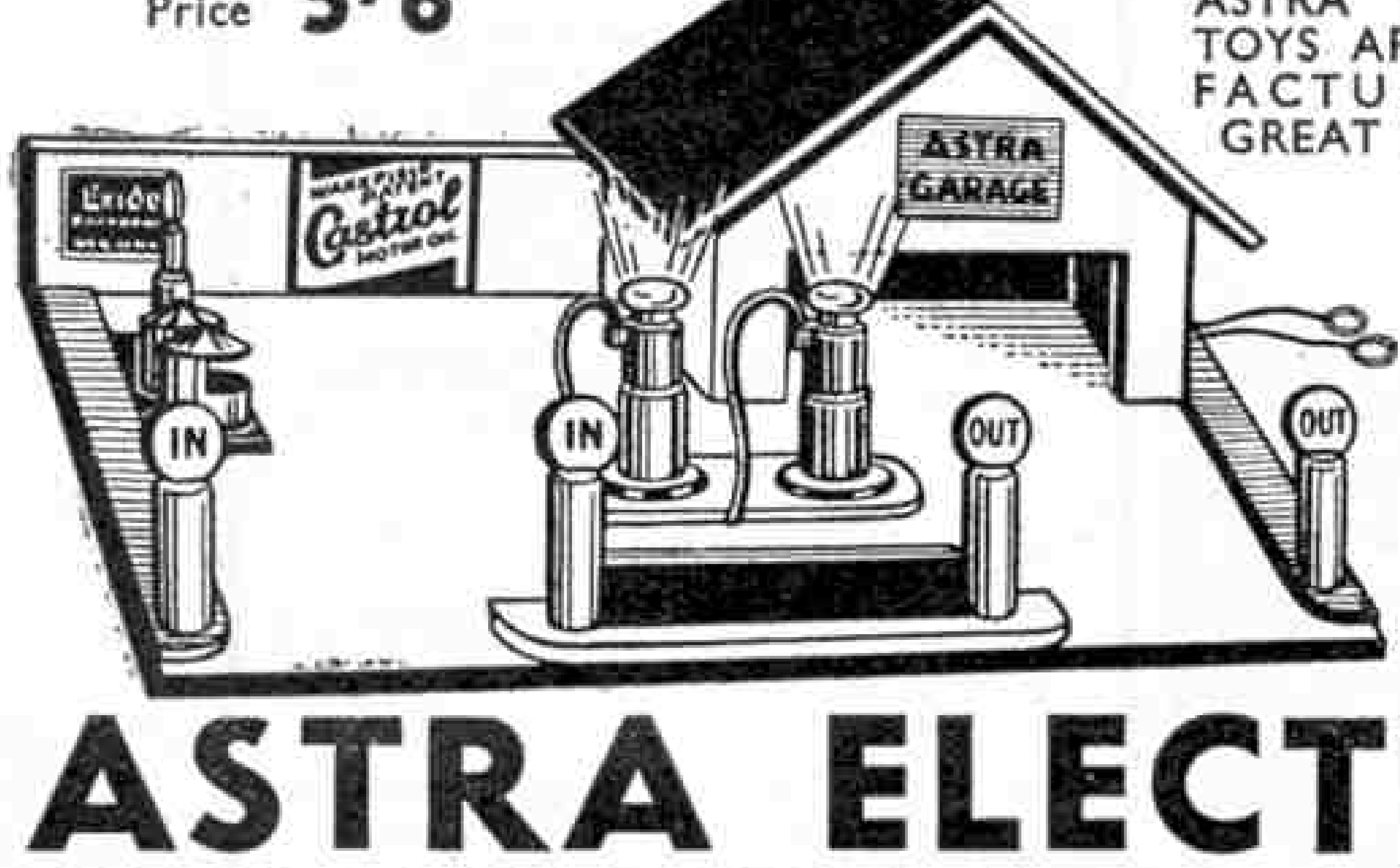
Three-Light Traffic Signal. Height 7¾". Complete with standard battery housed in stem and switch controlling red, amber and green light. Black finish.

Price
3/9

GARAGE for Miniature Motor Cars 12"x10". Finished in attractive colours with oil bins and illuminated petrol pumps.

Price **5/6**

ASTRA ELECTRIC TOYS ARE MANUFACTURED IN GREAT BRITAIN.



Price
3/6

PETROL PUMP

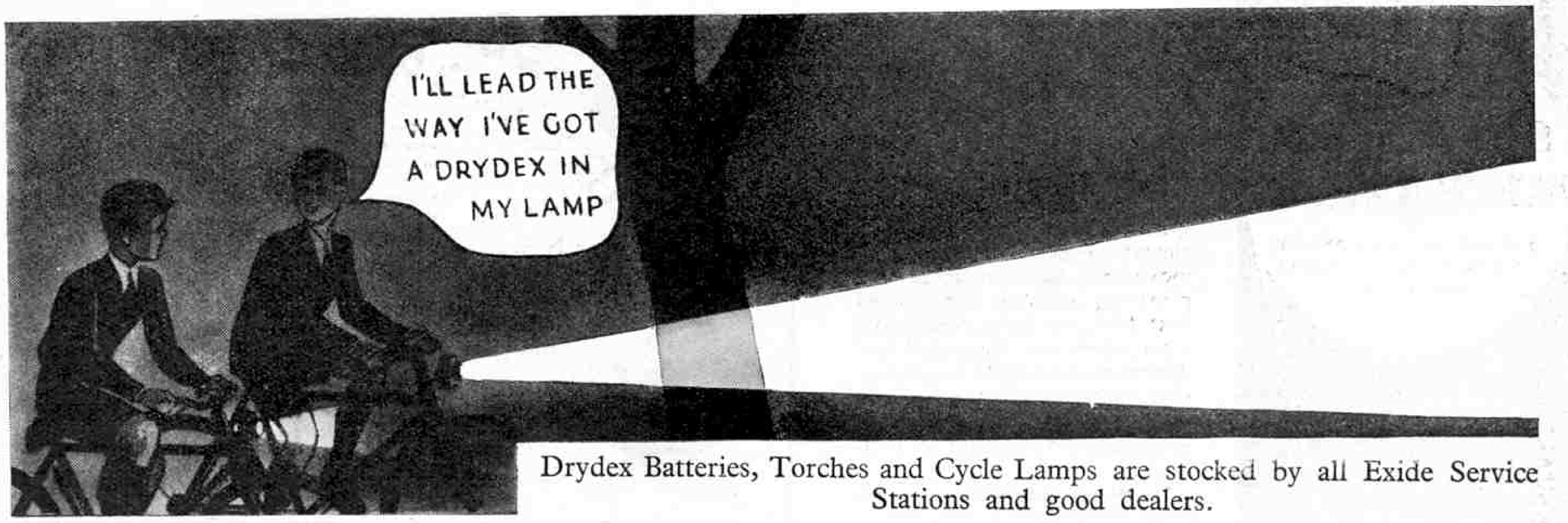
Illuminated Pump, 6" high. Complete with bulb and standard battery housed in stem. Rubber feed pipe. Red finish.

ASTRA TOYS ARE ON SHOW AT:

Harrods, Barkers, Selfridges, Hamleys, Army and Navy Stores, Rushworths, Brown Muffs, Jenners, Lewis's Ltd. (Manchester, Liverpool, Birmingham, Leeds and Glasgow), and all shops where good toys are stocked.

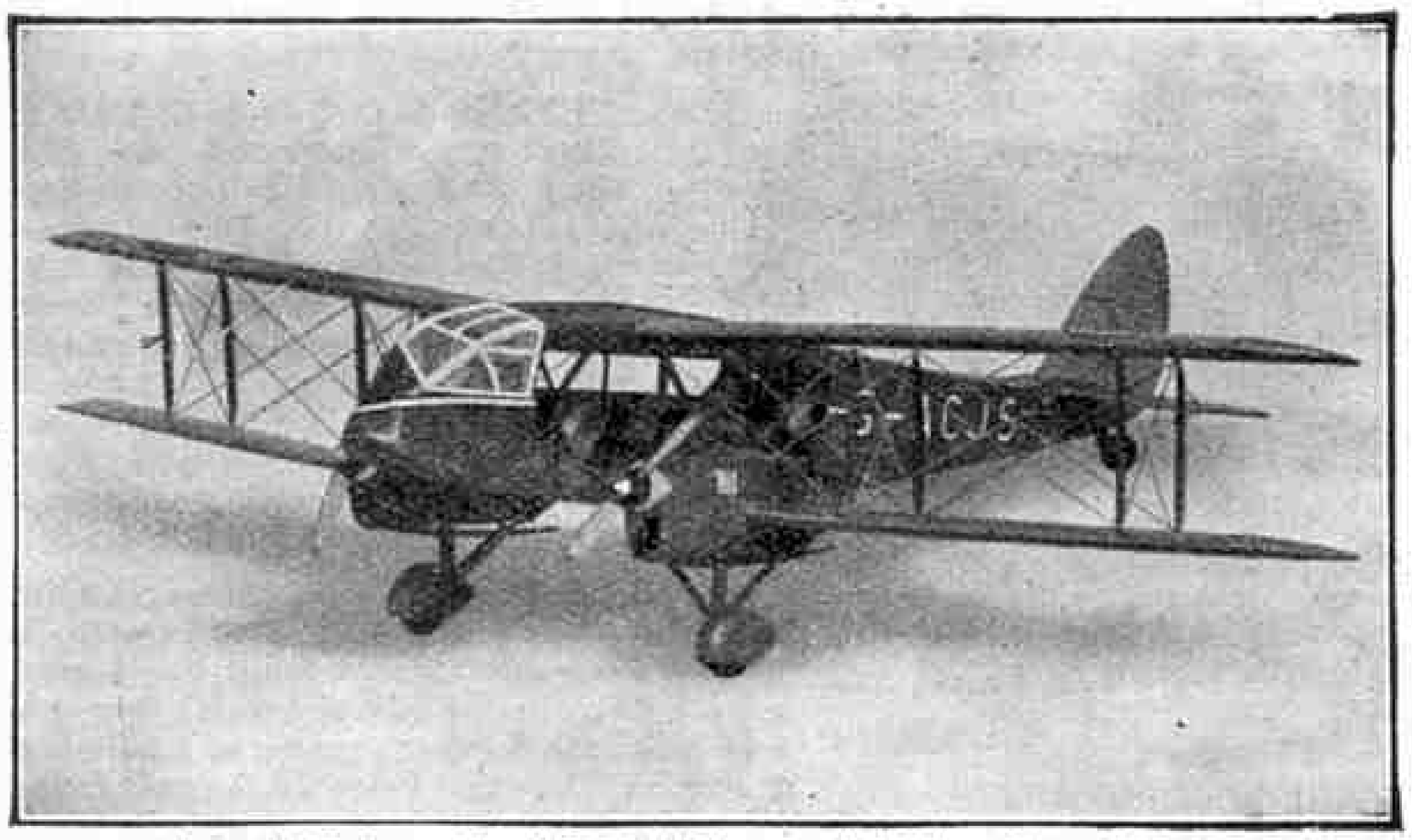
ASTRA ELECTRICAL TOYS

PERCY GOODWIN LTD. (Sole Concessionaires), 27, Paper St., London, E.C.1


I'LL LEAD THE WAY I'VE GOT A DRYDEX IN MY LAMP

Drydex Batteries, Torches and Cycle Lamps are stocked by all Exide Service Stations and good dealers.

AEROMODELS



Actual Photograph of D.H. "Dragon." Wing Span 23½ ins.

SCALE MODEL CONSTRUCTION SETS 1/24 Actual Size

Making scale model aircraft is an engrossing hobby. Aeromodel Kits have been specially designed to enable YOU to build Perfect Detailed Scale Models of Exhibition Standard without special tools or skill. Aeromodels are "Built Up" with double surfaced correctly cambered wings on spars and ribs, and cabin types have opening doors, transparent windows and interior seats.

	PRICE	Post Free Gt. Brit.	do. Abroad
1. DE HAVILLAND GIPSY MOTH ...	3/–	3/4	5/3
2. COMPER "SWIFT"	3/6	3/10	5/9
3. DE HAVILLAND "PUSS MOTH" ...	3/6	3/10	5/9
4. SUPERMARINE SCHNEIDER SEAPLANE	4/–	4/4	6/3
5. DE HAVILLAND "DRAGON"	7/6	8/–	9/9
6. DE HAVILLAND "FOX MOTH" ...	4/–	4/4	6/3
7. S.E.5A	3/6	3/10	5/9
8. HAWKER "HART"	5/–	5/6	7/3
9. SOPWITH "CAMEL"	4/–	4/6	6/3
10. BRISTOL "BULLDOG"	5/–	5/6	7/3

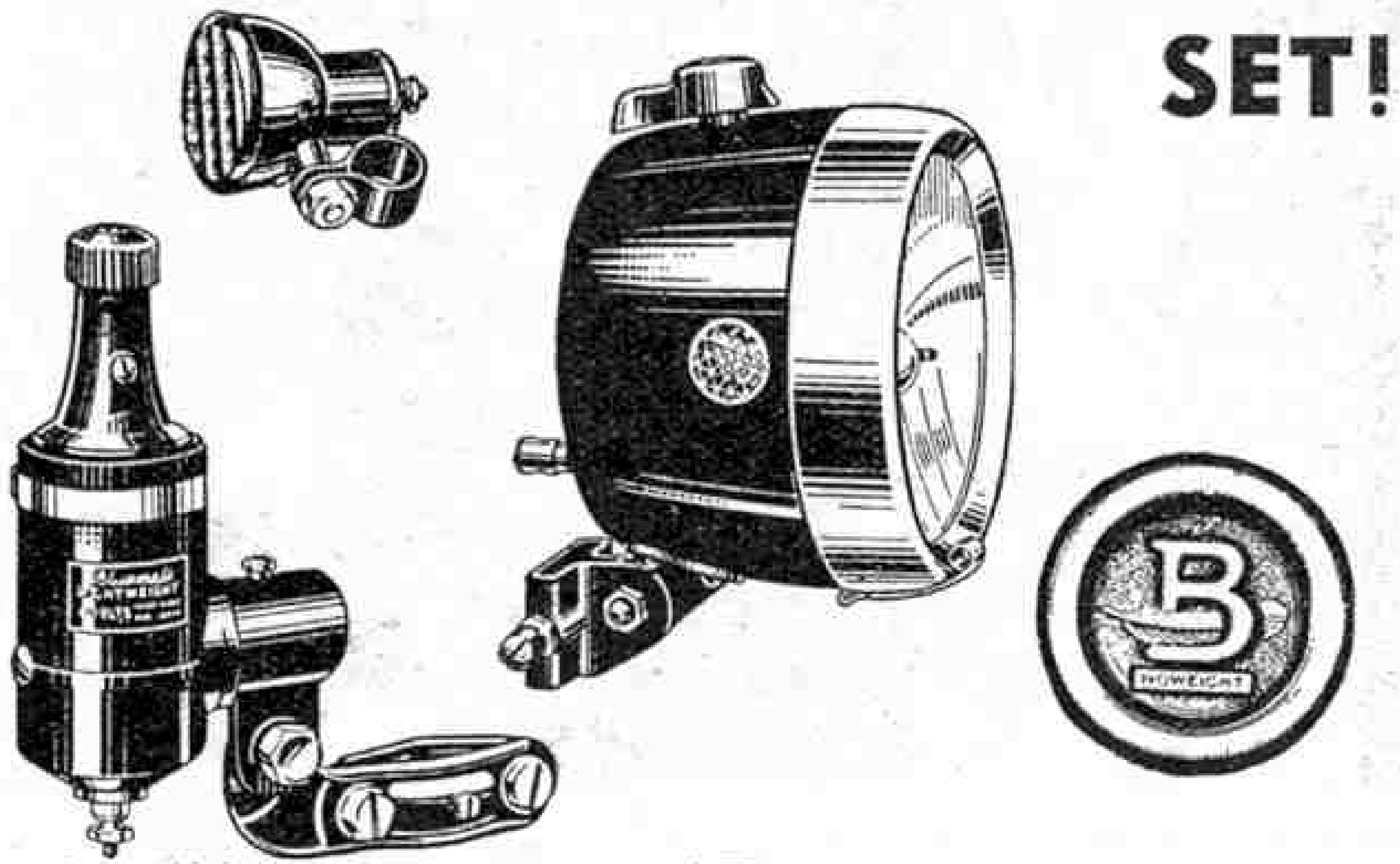
Fill in the coupon and post it to-day. A ½d. stamp is sufficient if the envelope is unsealed.

Please send me free illustrated literature containing full details of all Aeromodel Sets.
Name..
Address ....
....*M.*

AEROMODELS LTD.
Hooton Road,
Willaston, Wirral,
Cheshire.

Trade enquiries are invited.

"LIGHTWEIGHT" DYNAMO SET!



A head light like a motor car! This is what the new Bluemel "Lightweight" Dynamo set gives you. You generate your own electric power as you ride.

- Dynamo over 20% lighter than average.
- Made of shock-proof material.
- Well-designed dynamo ensures smooth running.
- Modern black and chromium twin-bulb headlamp with two-way switch.
- Combined rear lamp and officially approved reflector—can be used as either.

PRICE **23/-** COMPLETE Less Battery

Bluemel's

Send postcard for complete new list of "Featherweight" and "Noweight" Accessories — mudguards, reflectors, lamps, horns, etc.

BLUEMEL BROS. LTD.,
Dept. 27, WOLSTON, near COVENTRY.

CONSTRUCTIONAL OUTFITS

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PRICES 10/- to 39/6
BUILD YOUR OWN:
MICROSCOPES,
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Countless Models of interest to everyone.
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Films from 1/- to 6/-

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MECCANO

STANDARD MECHANISMS

ARE

STANDARD MECHANICAL MOVEMENTS
CONSTRUCTED AND DEMONSTRATED
WITH MECCANO

PRICES

United Kingdom 1/-
New Zealand 1/6
South Africa 1/6
Canada 30c

. . . A Manual for the keen model-builder

The Meccano "Standard Mechanisms" Manual has been specially written to show how almost every machine and movement used in actual engineering can be reproduced with Meccano parts. Nearly 200 mechanisms are illustrated and described in a simple manner, so that you can include them in your own models, making them real engineering structures in miniature.

The Manual can be obtained from any Meccano dealer, price 1/- (New Zealand and South Africa, 1/6, Canada 30 cents).

YOU **MUST** HAVE THIS MANUAL.

MECCANO
STANDARD MECHANISMS
STANDARD MECHANICAL MOVEMENTS CONSTRUCTED AND DEMONSTRATED WITH MECCANO

NEW MECCANO PARTS FOR OLD!

Good News for Meccano Boys

Every Meccano boy should know of the wonderful Meccano Part Exchange Scheme, in order to take the fullest advantage of it.

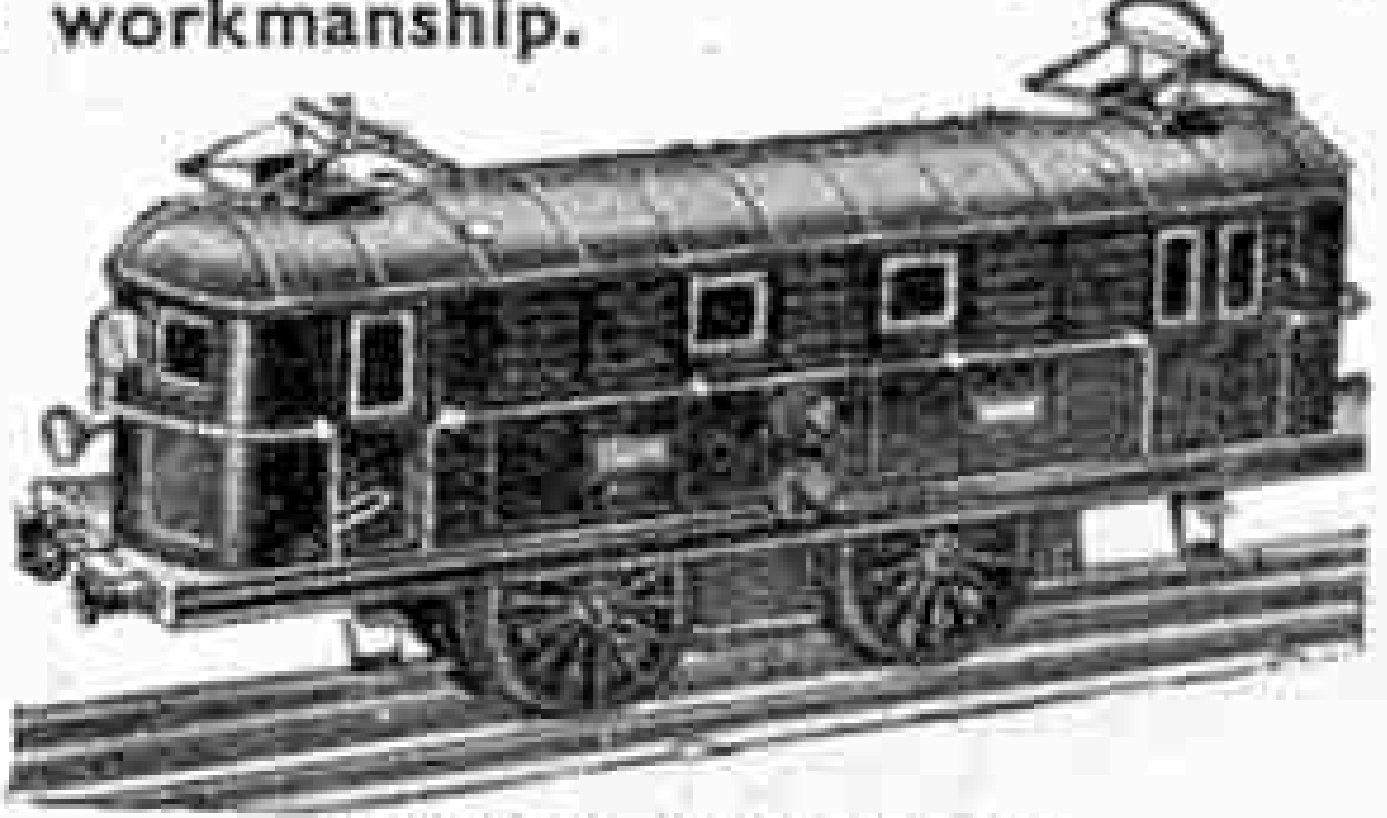
We undertake to exchange any damaged Meccano parts for similar new parts at half the current list price, no matter how old or how much damaged the parts are. Just send them to us, addressed to the Service Department, Meccano Limited, Binns Road, Liverpool 13, together with a remittance covering half the cost of the new parts. The remittance should include postage on the new parts and will be exactly the same as that you pay on the parcel of old parts you send us.

It is very important that you enclose your own name and address written in plain characters.

If you prefer to do so, you can effect the exchange through your dealer.

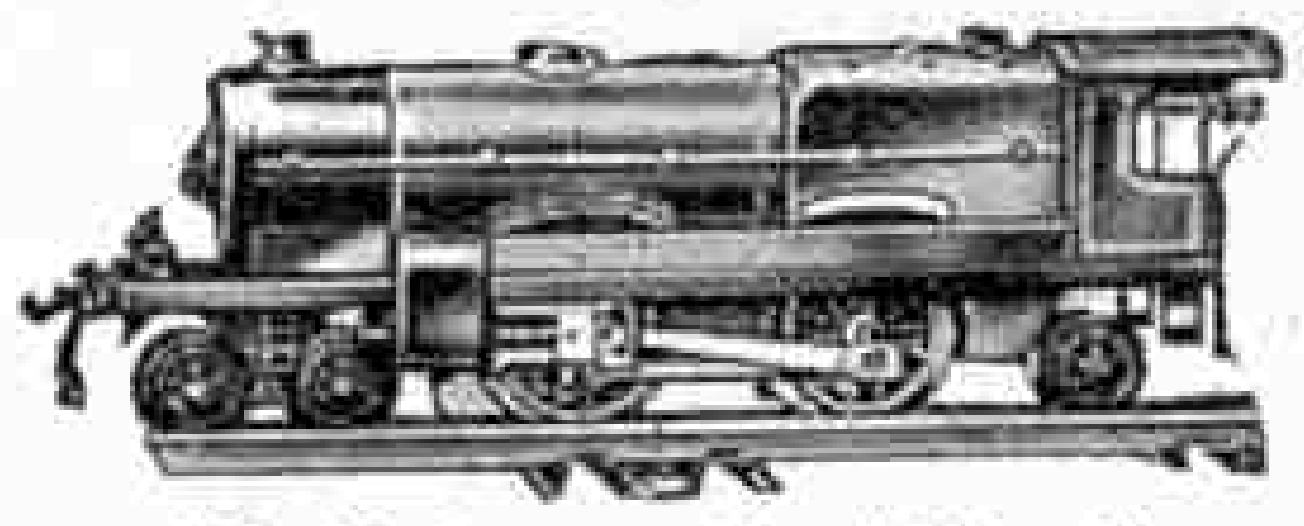
HORNBY LOCOS

We still have small stocks of the two locomotives shown below for disposal. Although these are not of our latest patterns, and therefore do not appear in our current catalogues, they are nevertheless of the finest quality and workmanship.



LE2/20 Locomotive

LE2/20 LOCOMOTIVE (20-volt). (Illustrated on the left.) This electric Locomotive is an exceptionally fine production. The motor with which it is fitted is designed to run from alternating mains supply through a 20-volt Transformer. This model can be obtained enamelled in red with cream roof, green with cream roof or cream with dark blue roof. Price **25/9** (post free)



E3/20 Locomotive (20-volt)

E3/20 LOCOMOTIVE (20-volt). This splendid Locomotive is fitted with a motor designed to run from the mains supply (alternating current only) through a 20-volt transformer capable of supplying 1 amp at 20 volts. Price **25/9** (post free)

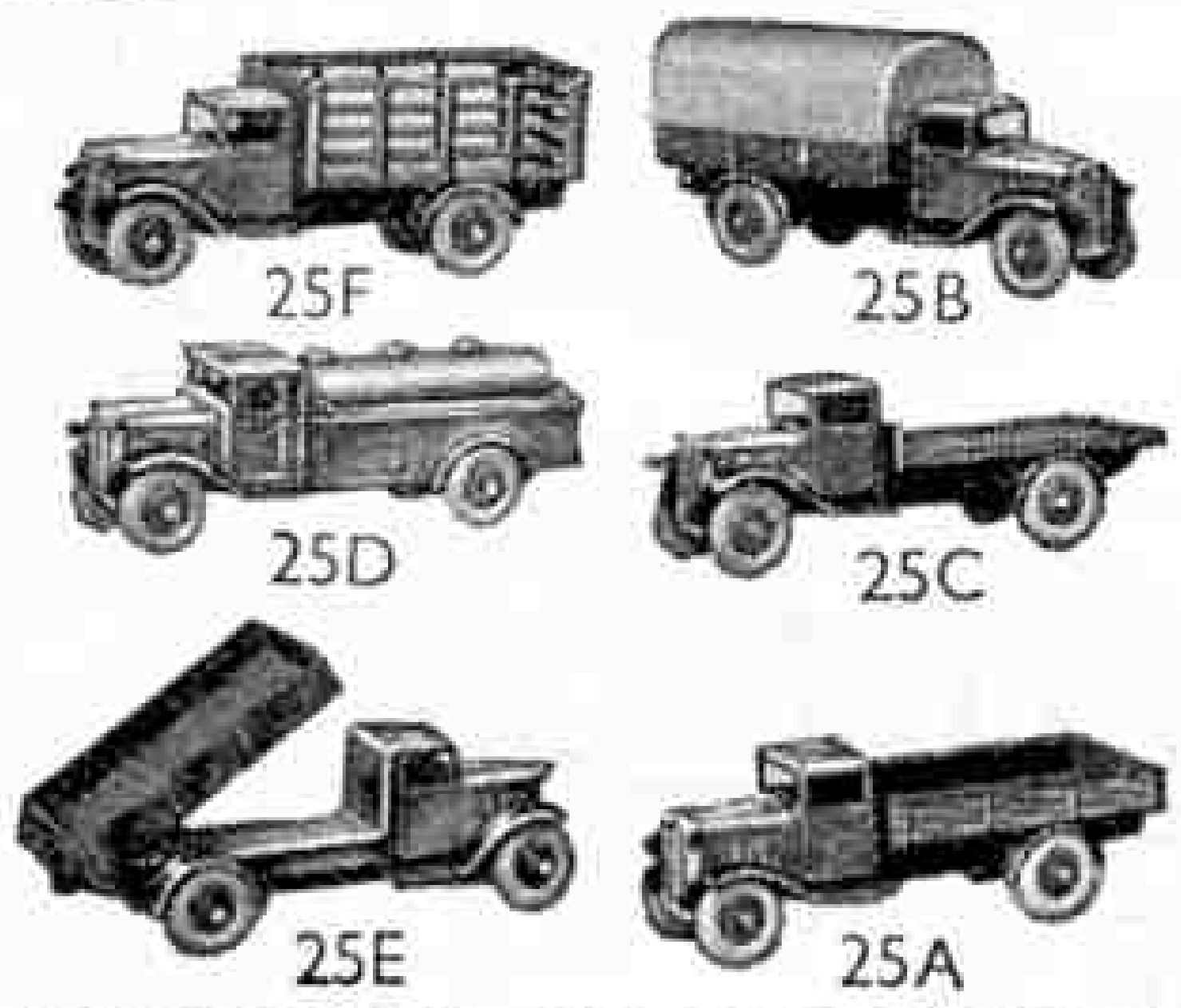
MECCANO LTD., BINNS ROAD, LIVERPOOL 13

PRODUCT of MECCANO LIMITED LIVERPOOL

DINKY TOYS

PRODUCT of MECCANO LIMITED LIVERPOOL

In this and the opposite advertisement are shown a selection of Dinky Toys, the ever-widening range of which contains many new and fascinating items. Ask your dealer for the complete illustrated price list.



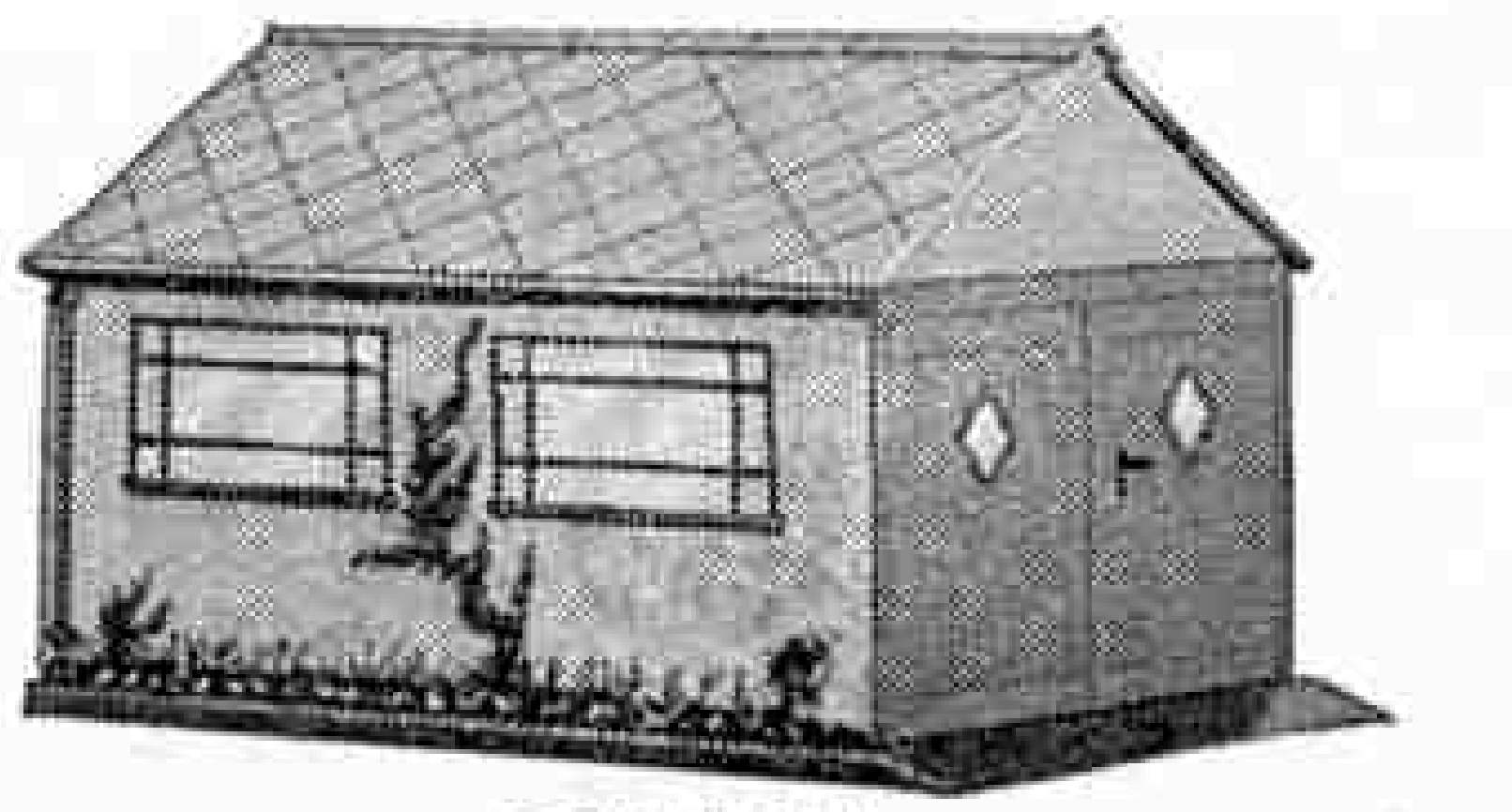
COMMERCIAL MOTOR VEHICLES

Dinky Toys No. 25

Fitted with rubber tyres and silver-plated radiators.

No. 25a	Wagon	each 9d.
No. 25b	Covered Van	,, 9d.
No. 25c	Flat Truck	,, 9d.
No. 25d	Petrol Tank Wagon ...	,, 9d.
No. 25e	Tipping Wagon	,, 9d.
No. 25f	Market Gardener's Van ...	,, 9d.

Price of complete set 4/6

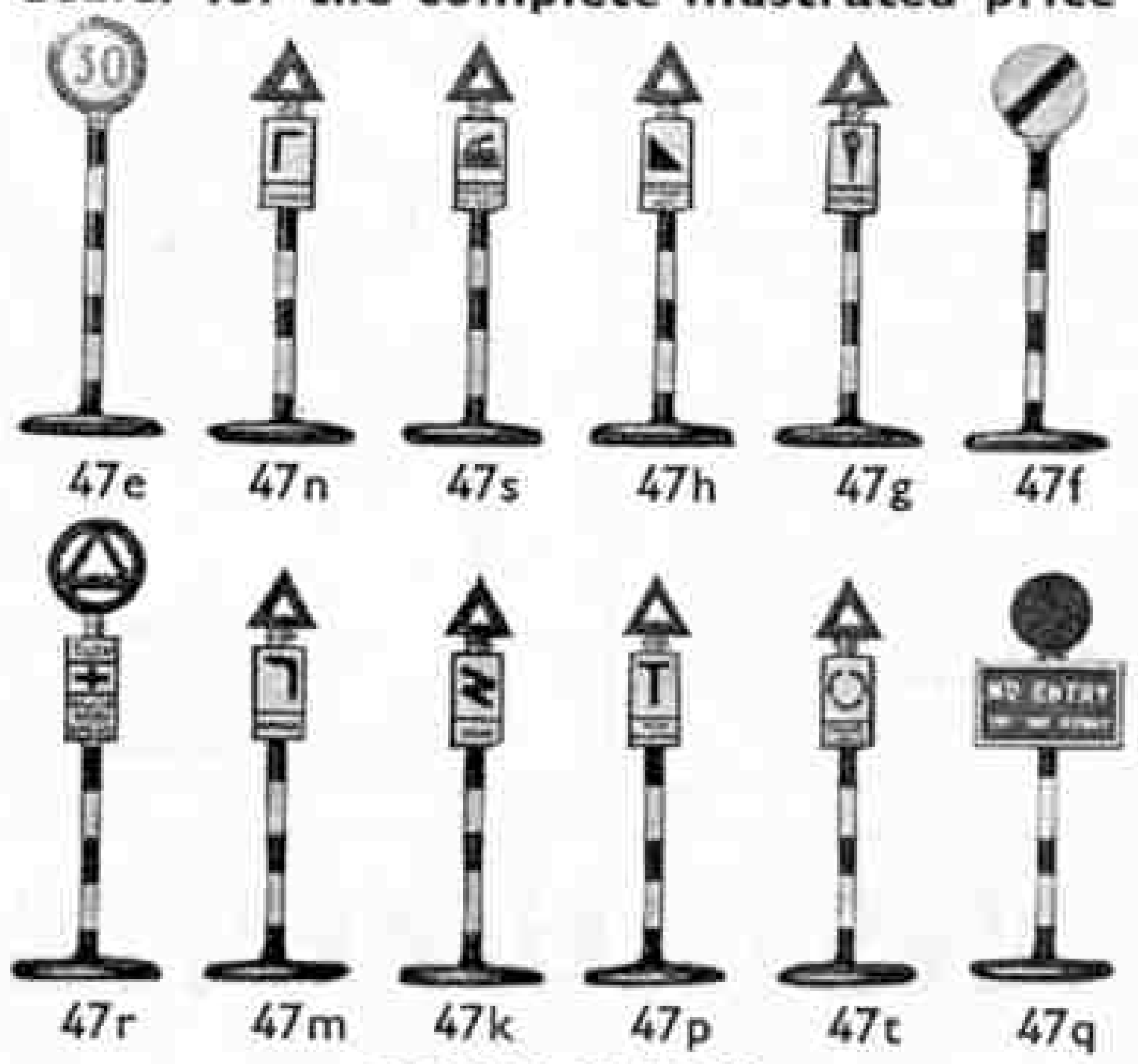


GARAGE

Dinky Toys No. 45

Fitted with opening double doors. Will accommodate any two Dinky Toy Motor Cars.

Price 1/6 each



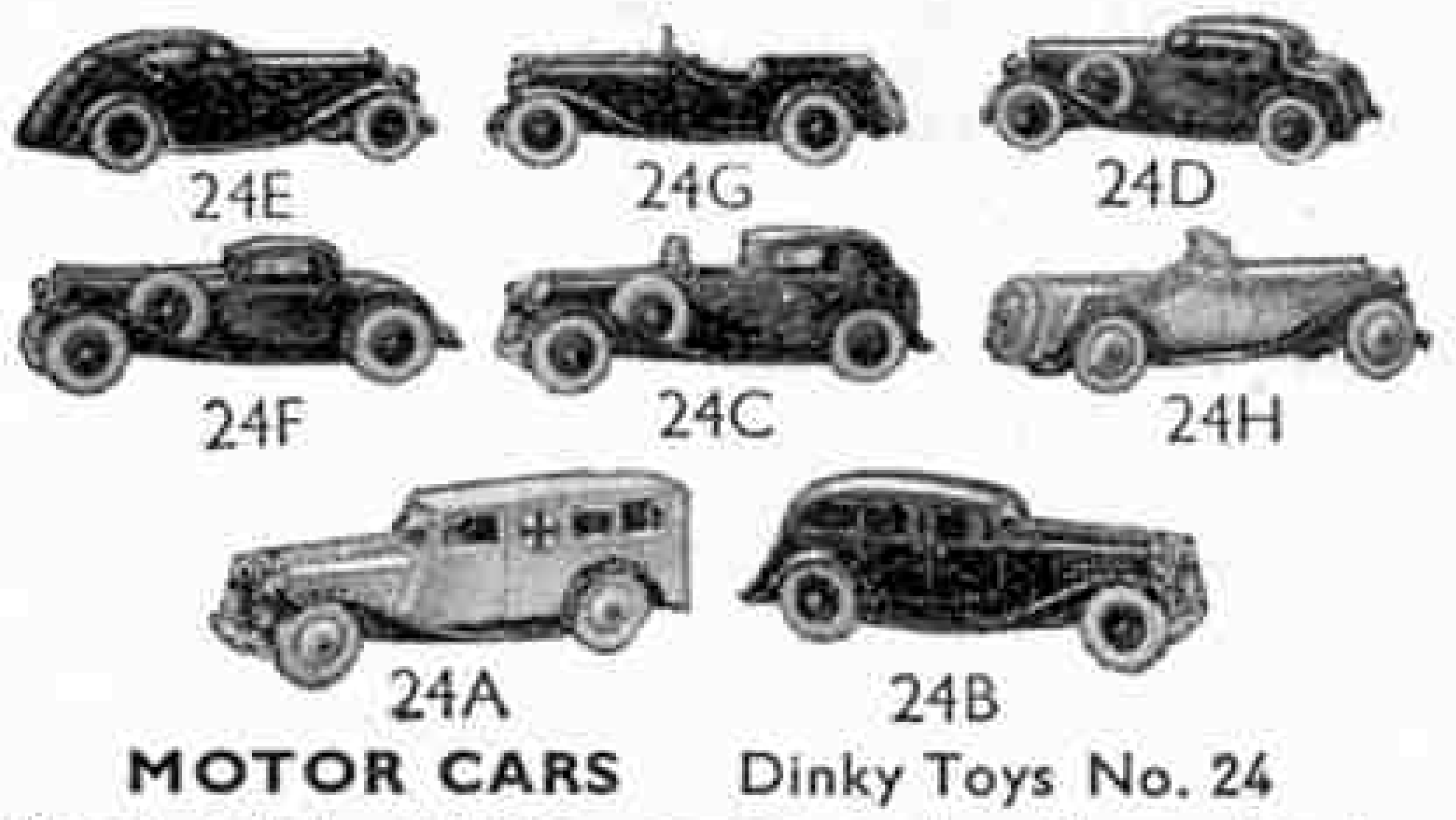
ROAD SIGNS

Dinky Toys No. 47

47e	"30 Mile Limit" Sign... ...	2 for 3d.
47f	"De-restriction" Sign ...	,, 3d.
47g	"School" Sign...	,, 3d.
47h	"Steep Hill" Sign	,, 3d.
47k	"Bend" Sign	,, 3d.
47m	Left-hand "Corner" Sign ...	,, 3d.
47n	Right-hand "Corner" Sign ...	,, 3d.
47p	"Road Junction" Sign ...	,, 3d.
47q	"No Entry" Sign	,, 3d.
47r	"Major Road Ahead" Sign ...	,, 3d.
47s	"Crossing, No Gates" Sign ...	,, 3d.
47t	"Round-About" Sign... ...	,, 3d.

Price of complete set of twelve 1/6

MECCANO LIMITED
LIVERPOOL 13

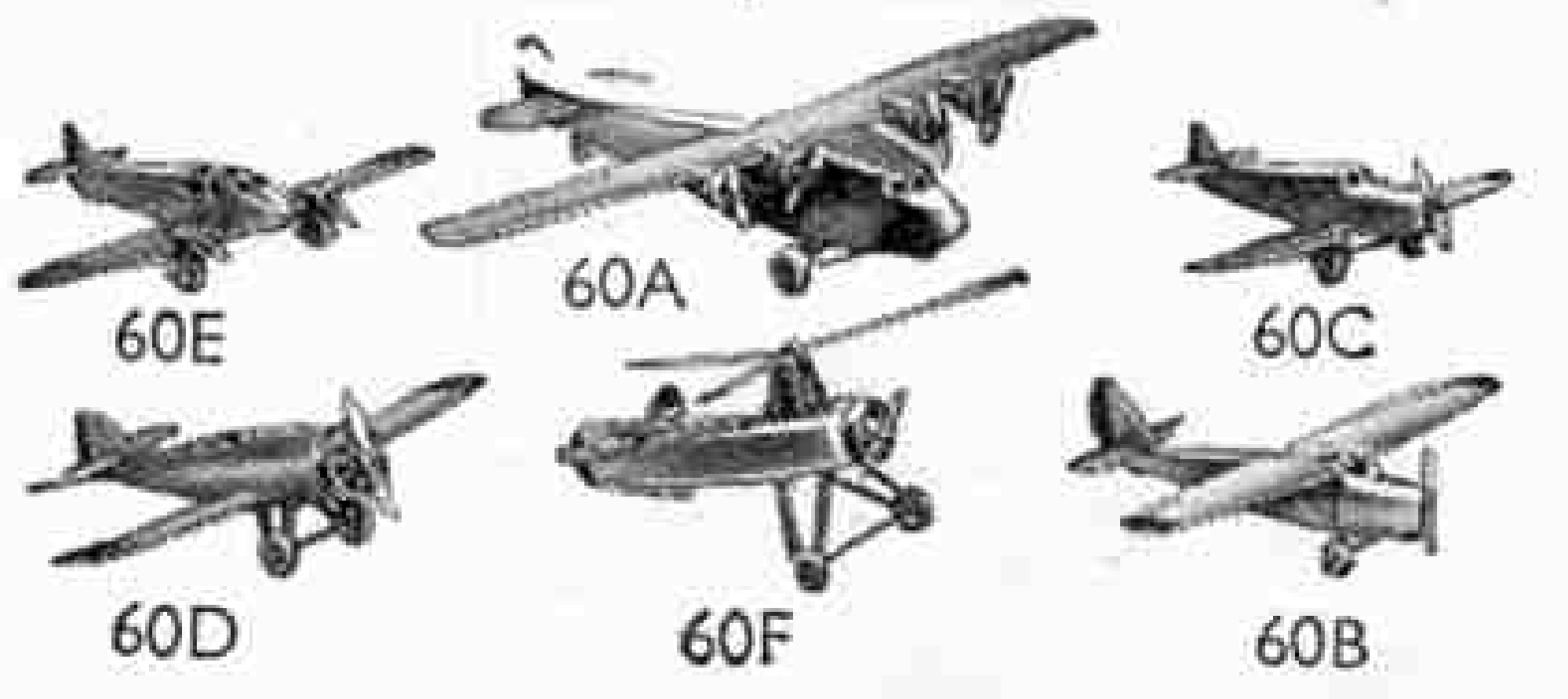


MOTOR CARS Dinky Toys No. 24

Fitted with rubber tyres and silver-plated radiators.

No. 24a	Ambulance...	each 9d.
No. 24b	Limousine	,, 9d.
No. 24c	Town Sedan	,, 9d.
No. 24d	Vogue Saloon	,, 9d.
No. 24e	Super Streamline Saloon ...	,, 9d.
No. 24f	Sportsman's Coupé ...	,, 9d.
No. 24g	Sports Tourer (4 seater)...	,, 9d.
No. 24h	Sports Tourer (2 seater)...	,, 9d.

Price of complete set 6/-



AEROPLANES Dinky Toys No. 60

No. 60a	Imperial Airways Liner ...	each 9d.
No. 60b	D.H. "Leopard Moth" ...	,, 6d.
No. 60c	Percival "Gull"	,, 6d.
No. 60d	Low Wing Monoplane ...	,, 6d.
No. 60e	General "Monospar" ...	,, 6d.
No. 60f	Cierva "Autogiro" ...	,, 6d.

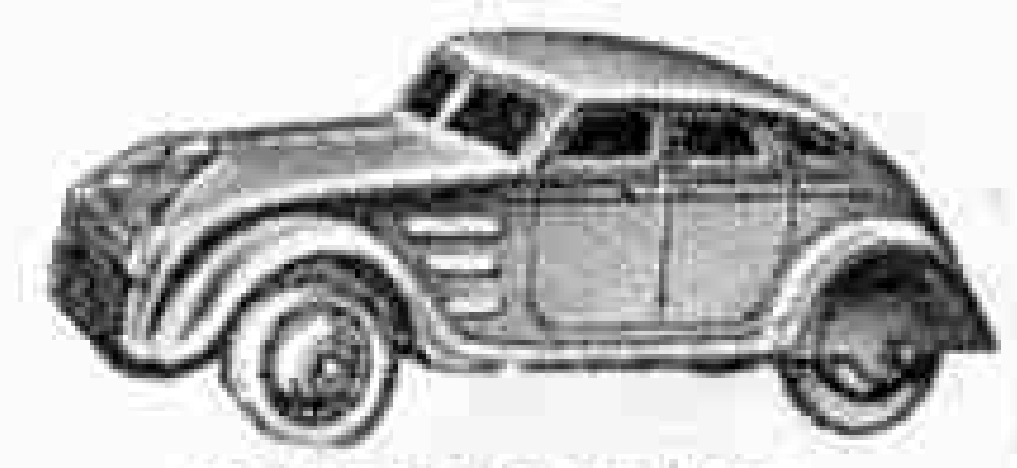
Price of complete set 3/-

TOYS OF QUALITY MADE BY MECCANO LTD

DINKY TOYS

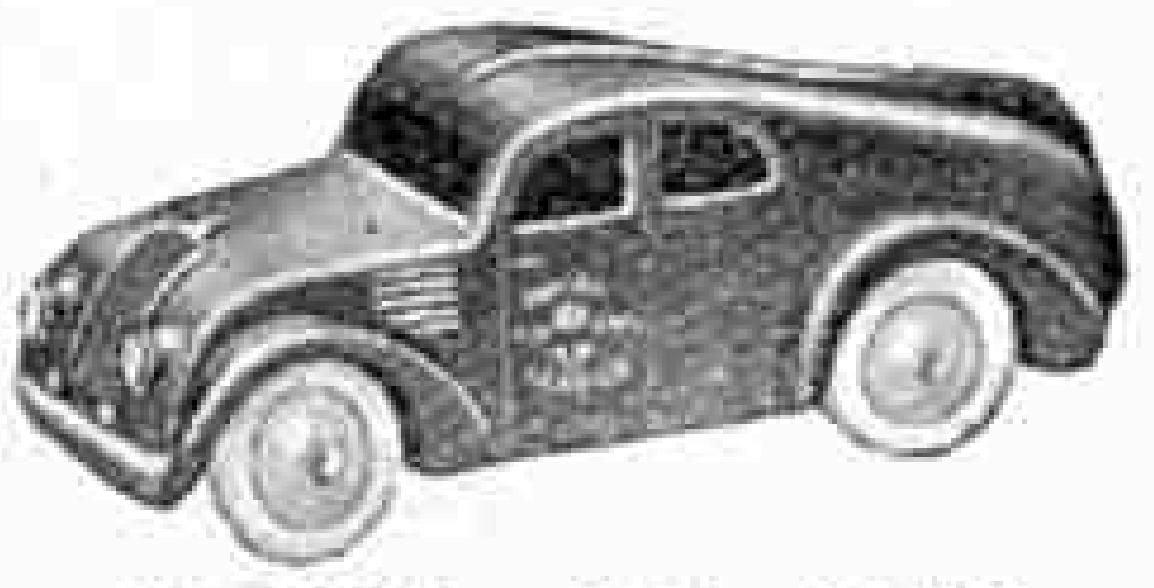
200 VARIETIES

A FASCINATING COLLECTING HOBBY

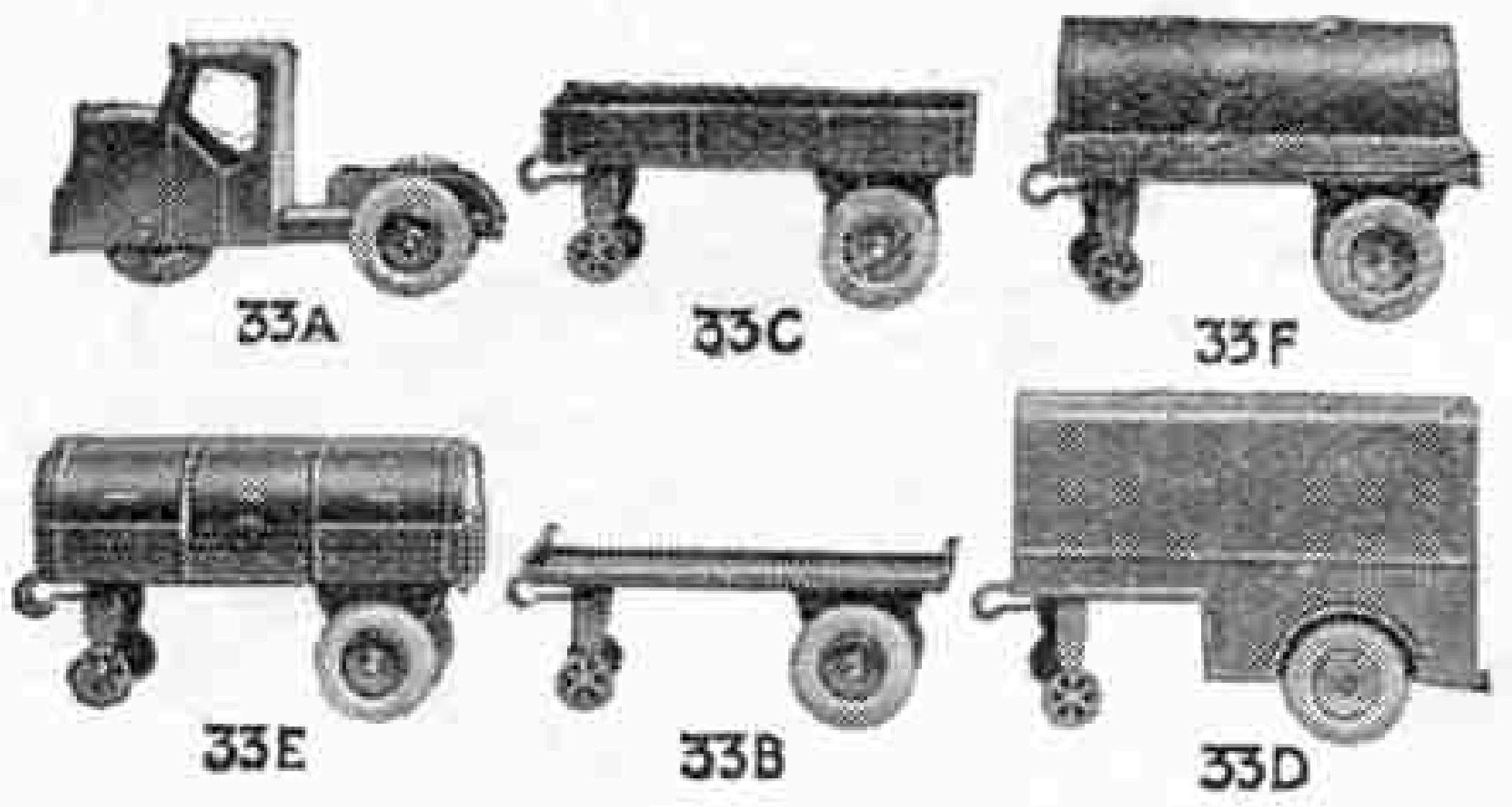


STREAMLINE SALOON
Dinky Toys No. 22h
Assorted colours. Fitted with rubber tyres.
Price 6d. each

Dinky Toys are the most realistic and the most attractive models in miniature ever produced. These wonderful toys are unique in their perfection of finish, and their range is so wide as to appeal to all tastes. Start now to collect these delightful little models.



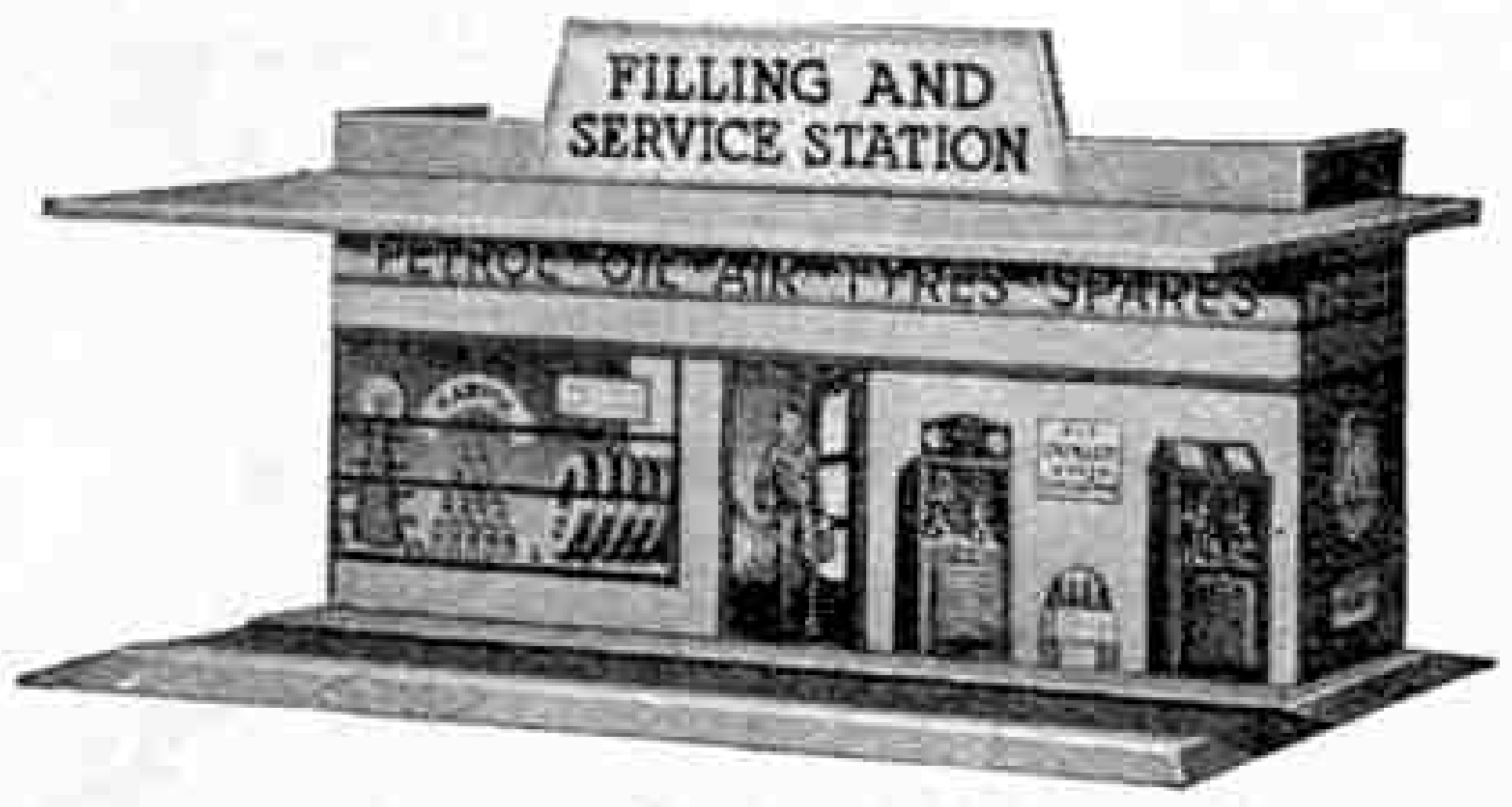
ROYAL AIR MAIL SERVICE CAR
Dinky Toys No. 34
In correct colours. Fitted with rubber tyres.
Price 6d. each



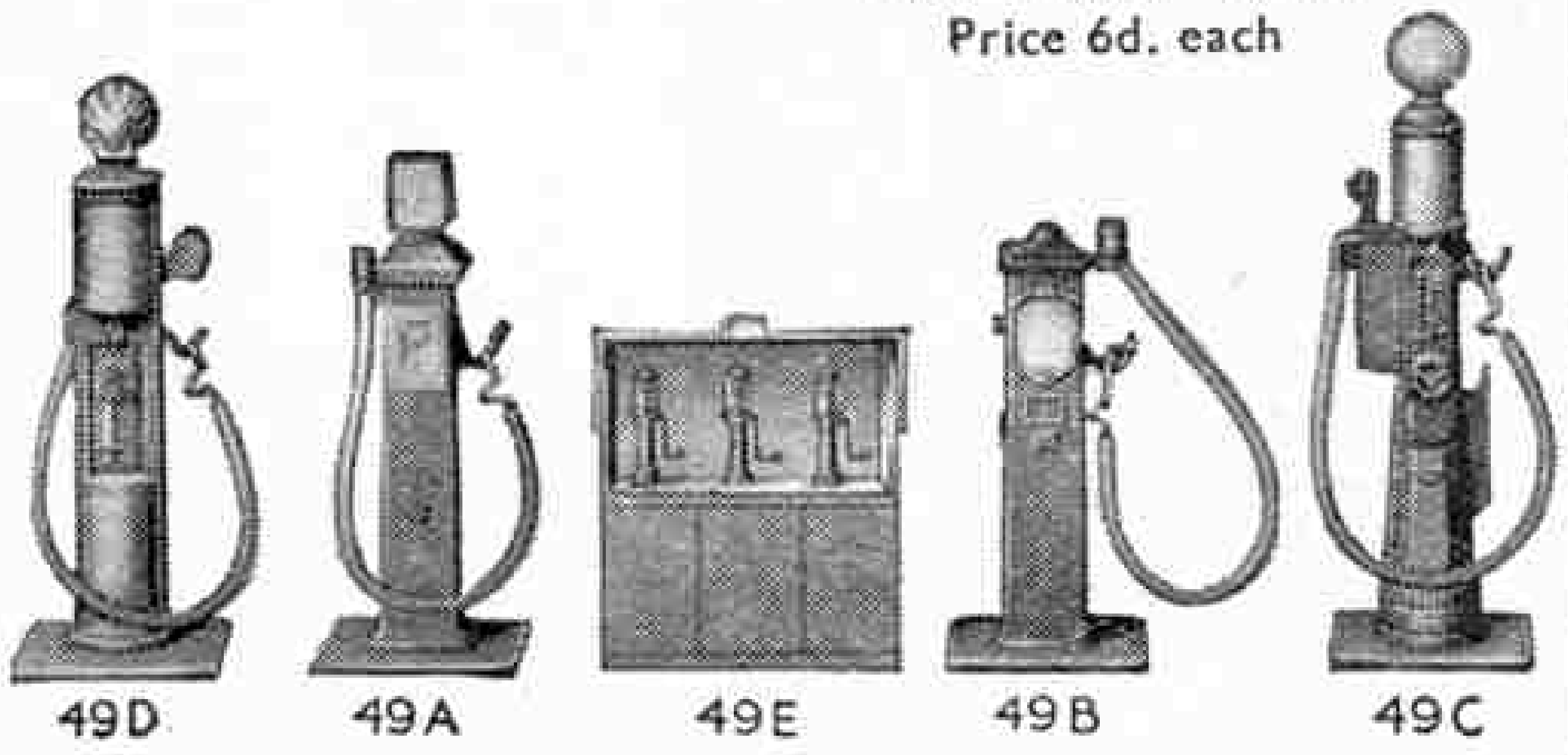
MECHANICAL HORSE AND FIVE ASSORTED TRAILERS
Dinky Toys No. 33
Fitted with rubber tyres

No. 33a	Mechanical Horse ...	... each	6d.
No. 33b	Flat Truck	... ,,	6d.
No. 33c	Open Wagon ...	... ,,	6d.
No. 33d	Box Van	... ,,	8d.
No. 33e	Dust Wagon ...	... ,,	8d.
No. 33f	Petrol Tank ...	... ,,	8d.

Price of complete set 3/6



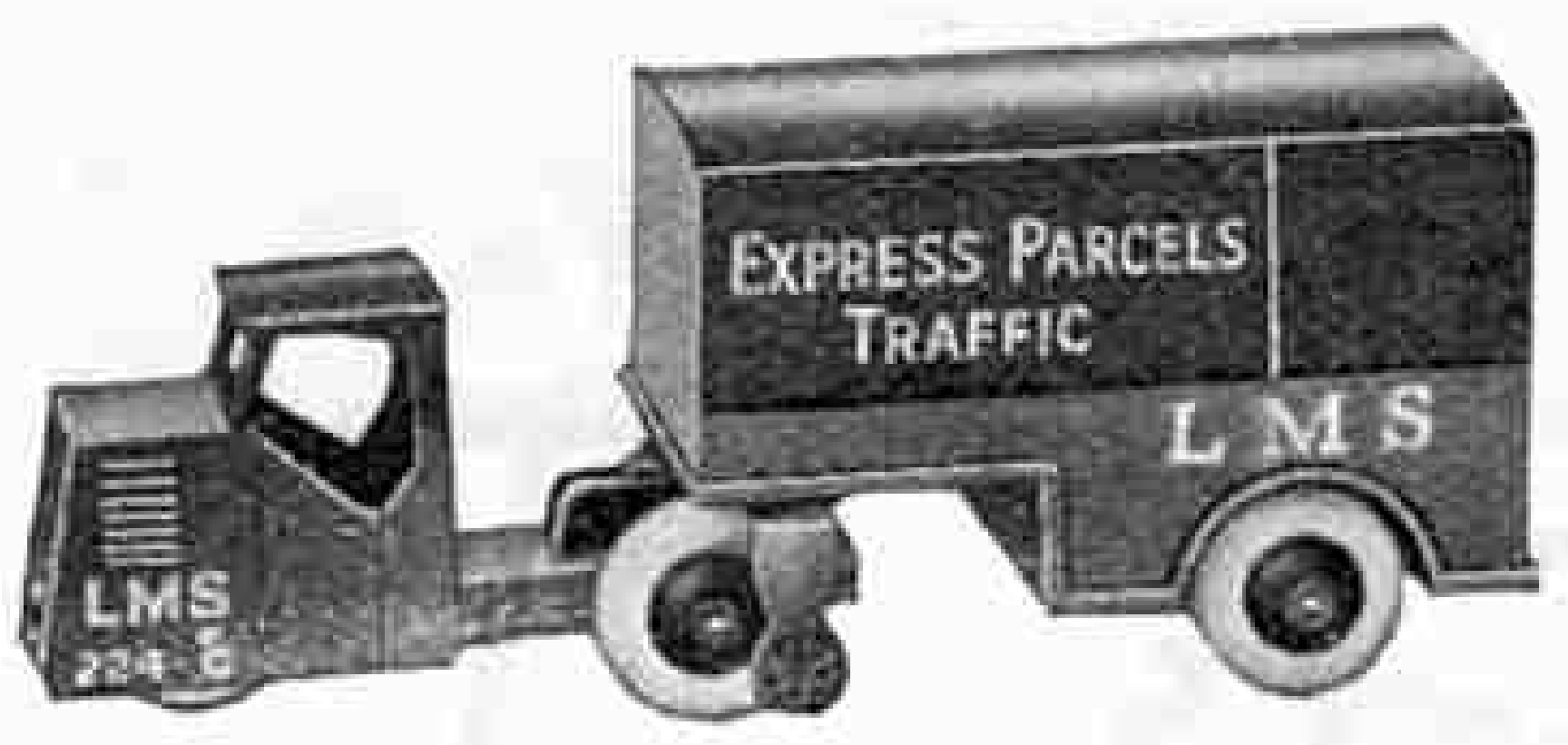
PETROL STATION
Dinky Toys No. 48
Accurate reproduction of a filling station. Tastefully finished in appropriate colours. Price 1/6 each.



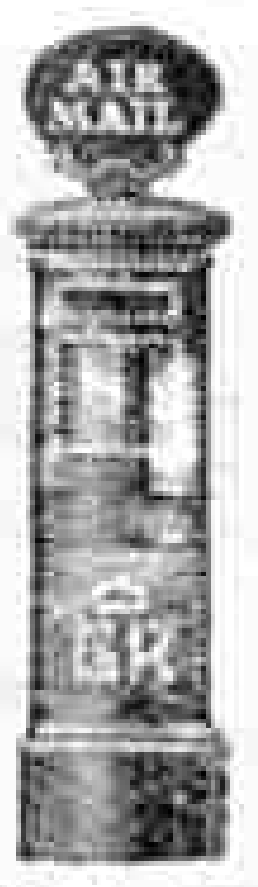
PETROL PUMPS
Dinky Toys No. 49
Scale models fitted with rubber hose pipes. Finished in correct colours.

No. 49a	Bowser Pump	... each	4d.
No. 49b	Wayne Pump	... ,,	4d.
No. 49c	Theo Pump	... ,,	4d.
No. 49d	Shell Pump	... ,,	4d.
No. 49e	Oil Bin (Pratts)	... ,,	3d.

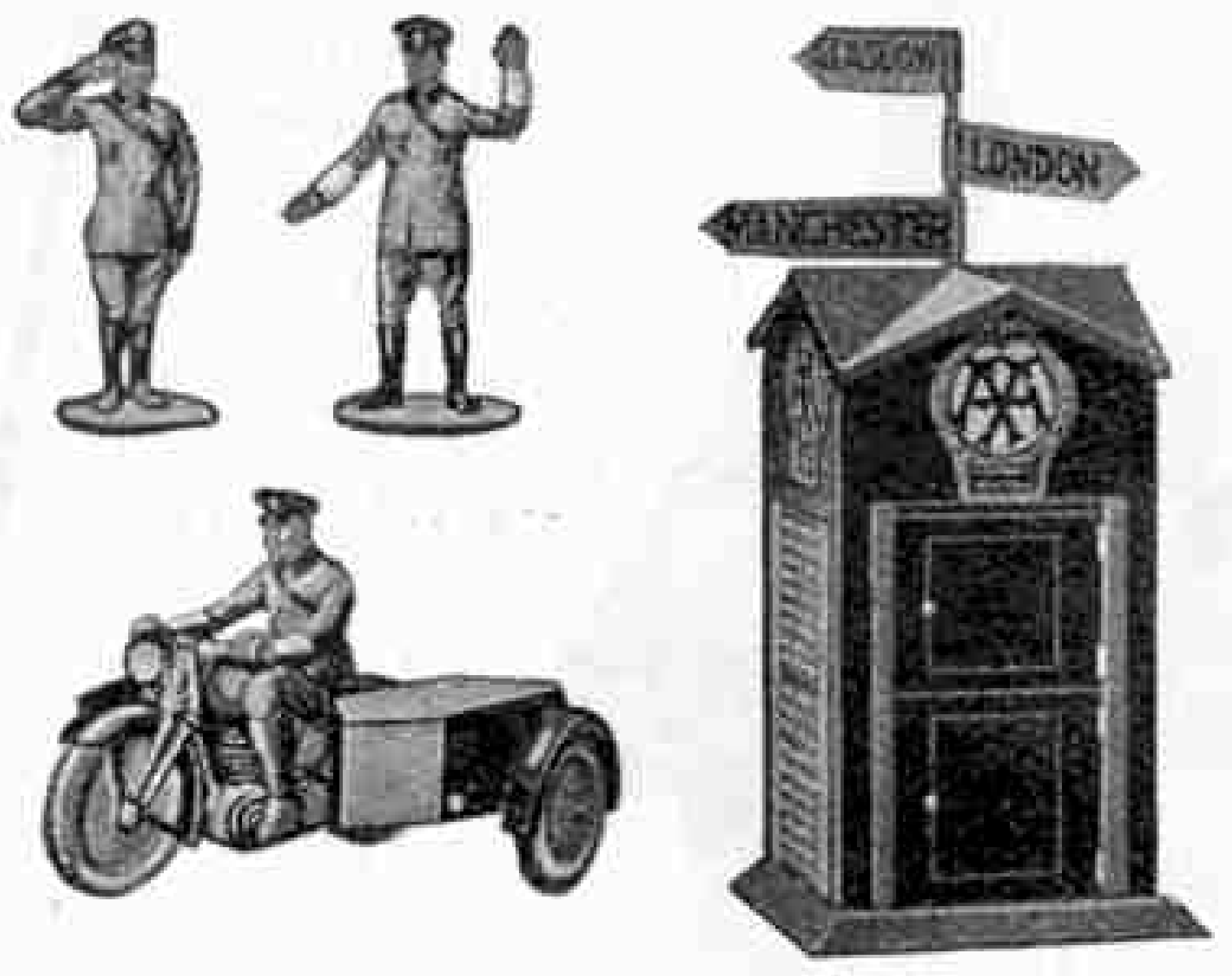
Price of complete set 1/6



RAILWAY MECHANICAL HORSE AND TRAILER VAN
Dinky Toys No. 33R
Price complete, L.M.S.R., L.N.E.R., G.W.R. or S.R., 1/6



PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price 3d. each



A.A. HUT, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 44
Every collector of Dinky Toys will find this new addition to the range of particular interest. Each item is finished in correct colours.

No. 44a	A.A. Hut	... each	8d.
No. 44b	A.A. Motor Cycle Patrol	,,	9d.
No. 44c	A.A. Guide directing traffic	,,	3d.
No. 44d	A.A. Guide at the salute	,,	3d.

Price of complete set 1/11

DELIVERY VANS
Dinky Toys No. 28/1

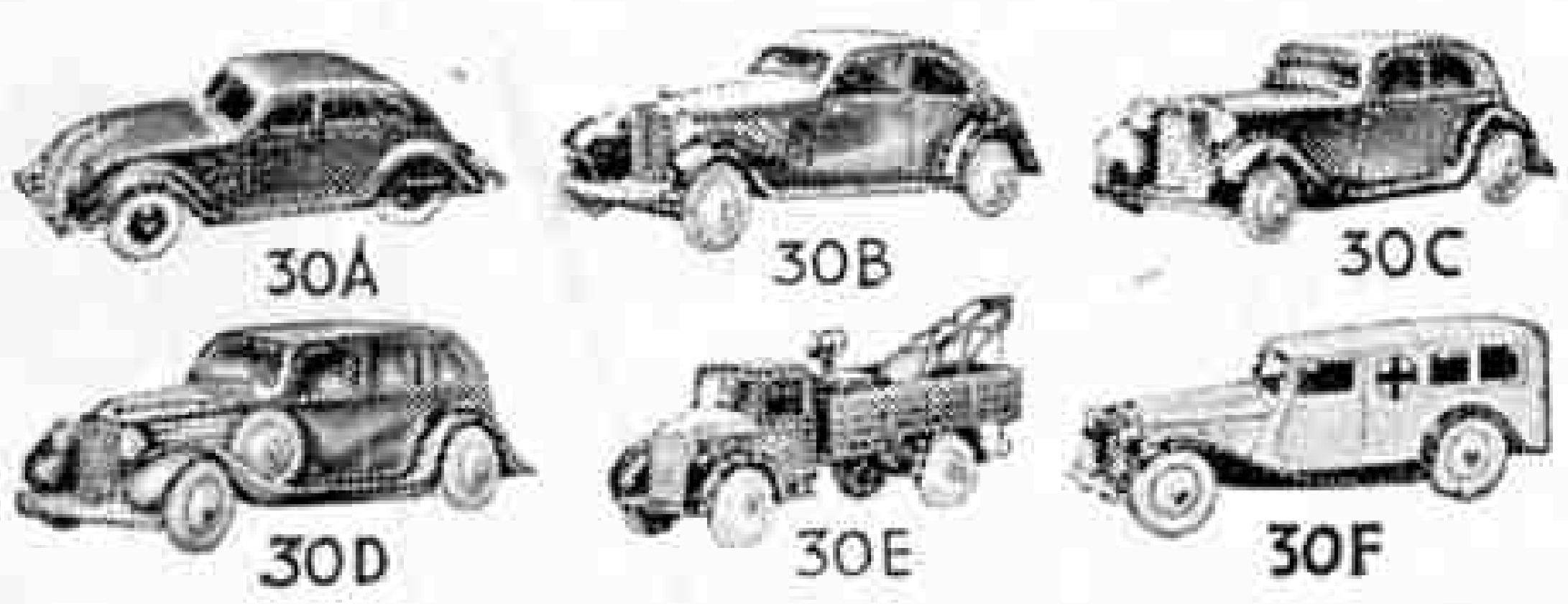
No. 28a	Hornby Train Van ...	each	6d.
No. 28b	Pickford's Removals Van	,,	6d.
No. 28c	Manchester Guardian Van	,,	6d.
No. 28e	Firestone Tyres Van ...	,,	6d.
No. 28f	Palethorpe's Sausage Van	,,	6d.
No. 28n	Atco Lawn Mowers Van ...	,,	6d.

Price of complete set 3/–

DELIVERY VANS
Dinky Toys No. 28/2

No. 28d	Oxo Van	each	6d.
No. 28g	Kodak Cameras Van ...	,,	6d.
No. 28h	Dunlop Tyres Van ...	,,	6d.
No. 28k	Marsh and Baxter's Sausage Van ...	,,	6d.
No. 28m	Wakefield's Castrol Oil Van	,,	6d.
No. 28p	Crawford's Biscuit Van	,,	6d.

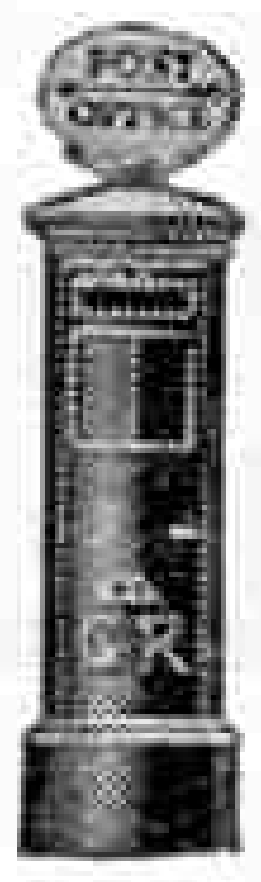
Price of complete set 3/–



MOTOR VEHICLES
Dinky Toys No. 30
Fitted with rubber tyres and silver-plated radiators.

No. 30a	Chrysler Airflow Saloon ...	each	9d.
No. 30b	Rolls-Royce Car	,,	9d.
No. 30c	Daimler Car	,,	9d.
No. 30d	Vauxhall Car	,,	9d.
No. 30e	Breakdown Car	,,	9d.
No. 30f	Ambulance	,,	9d.

Price of complete set 4/6



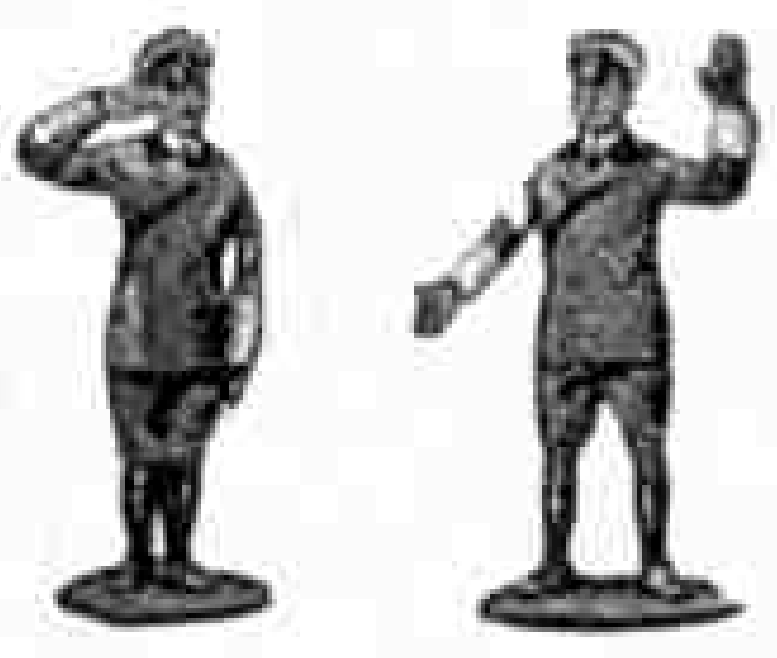
PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price 3d. each

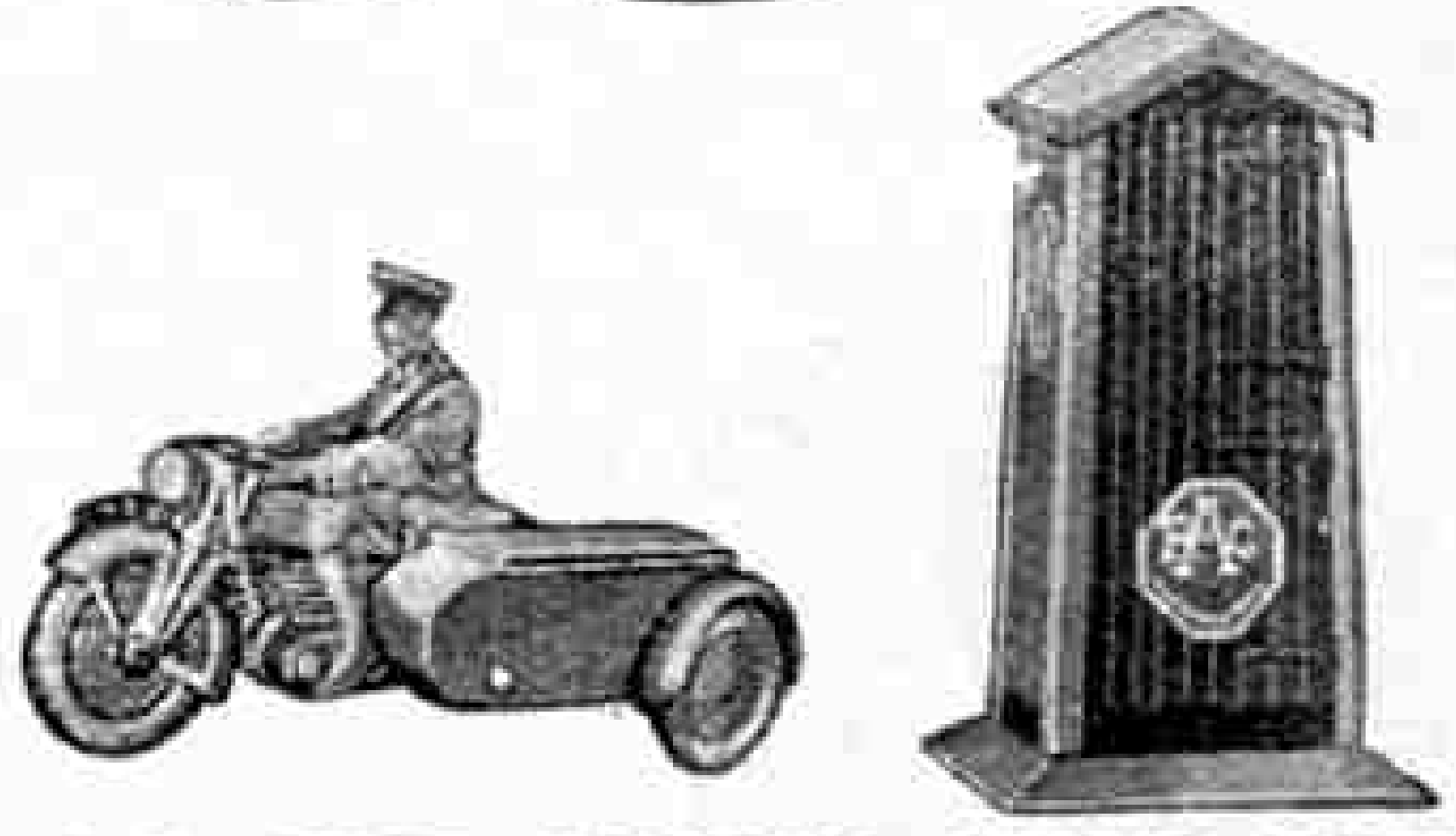
BEACON
Dinky Toys No. 47d
Realistic models of the Belisha Safety Beacons
Price 1d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a
(Four-face)
Price 3d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47b
(Three-face)
Price 3d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47c
(Two-face)
Right-angle or Back-to-back
Price 3d each





R.A.C. HUT, MOTOR CYCLE PATROL AND GUIDES
Dinky Toys No. 43
This set is representative of the familiar personnel and road hut of the R.A.C. Each item is finished in correct colours.

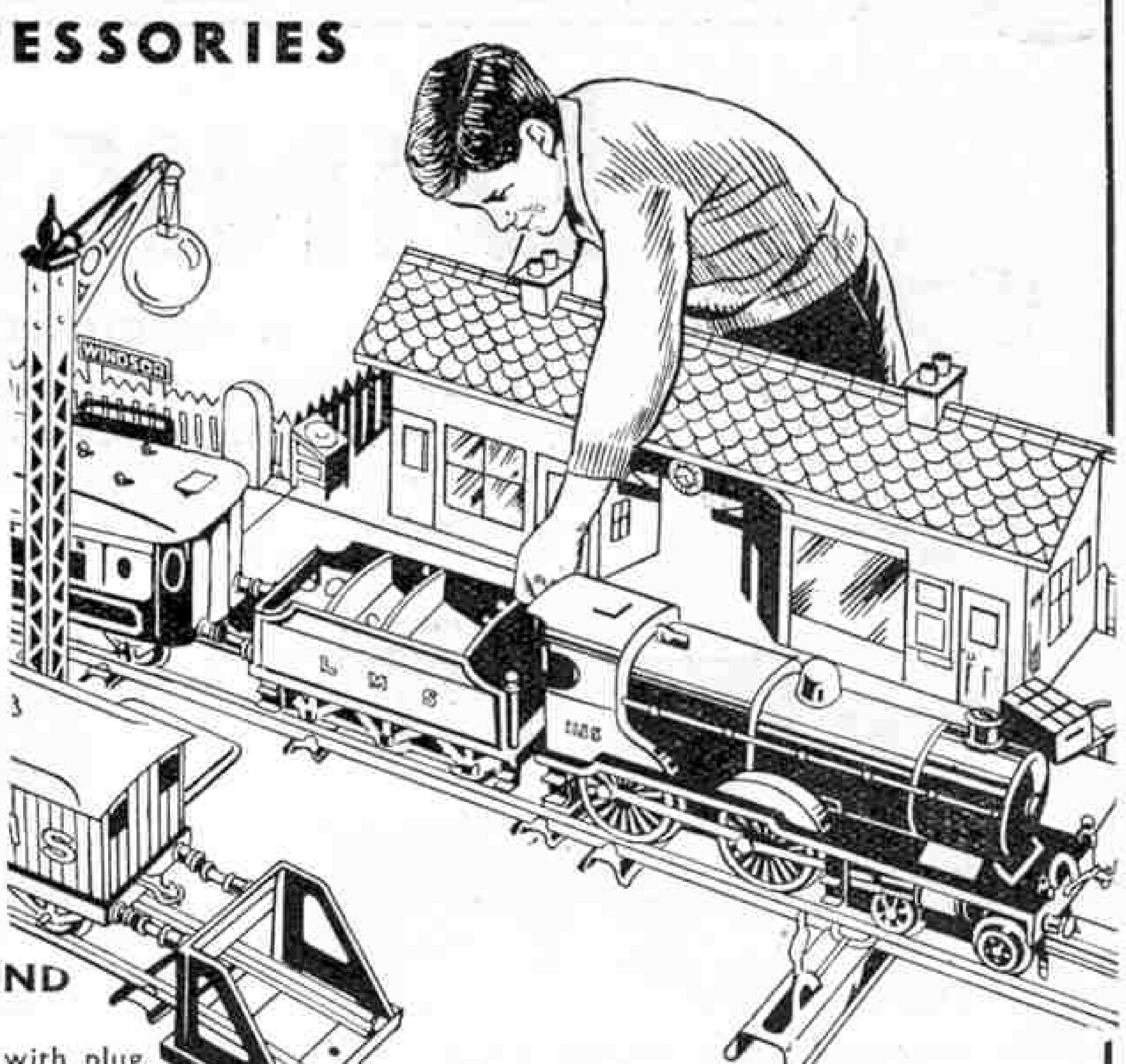
No. 43a	R.A.C. Hut...	each	6d.
No. 43b	R.A.C. Motor Cycle Patrol	,,	9d.
No. 43c	R.A.C. Guide directing traffic	,,	3d.
No. 43d	R.A.C. Guide at the salute	,,	3d.

Price of complete set 1/9

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

A NEW
ELECTRIC LIGHTING SYSTEM
FOR HORNBY ACCESSORIES

BRILLIANT, SAFE AND INEXPENSIVE



The following is a complete list of the Hornby Accessories available fitted for electric lighting on the new and simplified system adopted this season. These accessories are specially designed for lighting from the 3½-volt circuit of a Meccano T20A or T6A Transformer, and with each of these Transformers are packed for the purpose a pair of Plugs, an Earthing Clip and a coil of Wire, together with full instructions. The Accessories can also be lighted from an accumulator. Each Accessory is accompanied by an Earthing Clip and a Leaflet giving full instructions for use. Lamp bulbs are not provided with the Accessories.

No. E1E Engine Shed	Price 15/6	No. 2E Signal Gantry	Price 12/9
No. E2E Engine Shed	„ 23/-	No. E1E Level Crossing ...	„ 5/3
No. 2E Station	„ 9/3	No. E2E Level Crossing ...	„ 9/-
Island Platform E	„ 6/3	No. 1E Buffer Stops	„ 1/6
No. 2E Goods Platform... ...	„ 11/6	No. 2E Buffer Stops	„ 6/-
No. 2E Signal Cabin	„ 4/3	No. 2E Water Tank	„ 6/6
No. 2E Signal	„ 2/9	No. 1E Lamp Standard	„ 2/11
No. 2E Double Arm Signal ...	„ 3/11	No. 2E Lamp Standard	„ 3/3
No. 2E Junction Signal	„ 6/-		

The following items used in connection with the new system of Accessories lighting are available:

Plugs for sockets of Transformers T20A and T6A ... ... Price per pair, 6d.
Earthing Clips ... ... each 3d. Connecting Wire ... Price per coil 4d.

ACCESSORIES FOR LIGHTING WITH DISTRIBUTION BOX AND FLEXIBLE LEADS

The old type Accessories fitted for lighting by means of a Distribution Box and Flexible Leads with plugs and sockets are still available at the following prices:

	Price		Price		Price
No. E1E Engine Shed ...	18/6	No. 2E Double Arm Signal	6/6	No. 2E Water Tank ...	10/-
No. E2E Engine Shed ...	26/-	No. 2E Junction Signal ...	9/-	No. 1E Lamp Standard ...	3/6
No. 2E Station	11/6	No. 2E Signal Gantry ...	18/-	No. 2E Lamp Standard ...	4/3
Island Platform E	9/-	No. E1E Level Crossing ...	7/-	Flexible Leads, 9", 18", and 36". Prices 1/4, 1/5 and 1/6 respectively.	
No. 2E Goods Platform ...	15/-	No. E2E Level Crossing ...	11/-		
No. 2E Signal Cabin ...	5/6	No. 1E Buffer Stops ...	2/-		
No. 2E Signal	4/3	No. 2E Buffer Stops ...	7/-	Distribution Box ... Price 2/6	

MECCANO LTD.
BINNS ROAD, LIVERPOOL 13

Jolly fine fun - and instructional too!

LOTT'S BRICKS

How would you like to build this attractive house? And hosts of other models as well—Stations, Signal Boxes, Bridges, Goods Sheds. There is no end to the interesting things you can build. LOTT'S BRICKS are miniature Stone Building Bricks—British made.

Prices:
LOTT'S BRICKS, 2/- to 35/-
LODOMO *(with windows and doors)*, **3/6 to 12/6**
TUDOR BLOCKS *(for half timbered buildings)* **3/6 to 35/-**

LOTT'S Chemistry Sets

Box 5,
228 experiments,
21/-

If you are keen on Chemistry, this set is the very thing for you! You will have your own laboratory and be able to carry out scores of interesting experiments. The equipment varies with the size of the set and includes test tubes, crucibles, Bunsen burner, retort stand and many chemicals. Full instructions are supplied with each set. **Prices 3/6, 6/-, 10/6 to 42/-. Handsome Cabinets from £3/3/- to £5/5/-.**

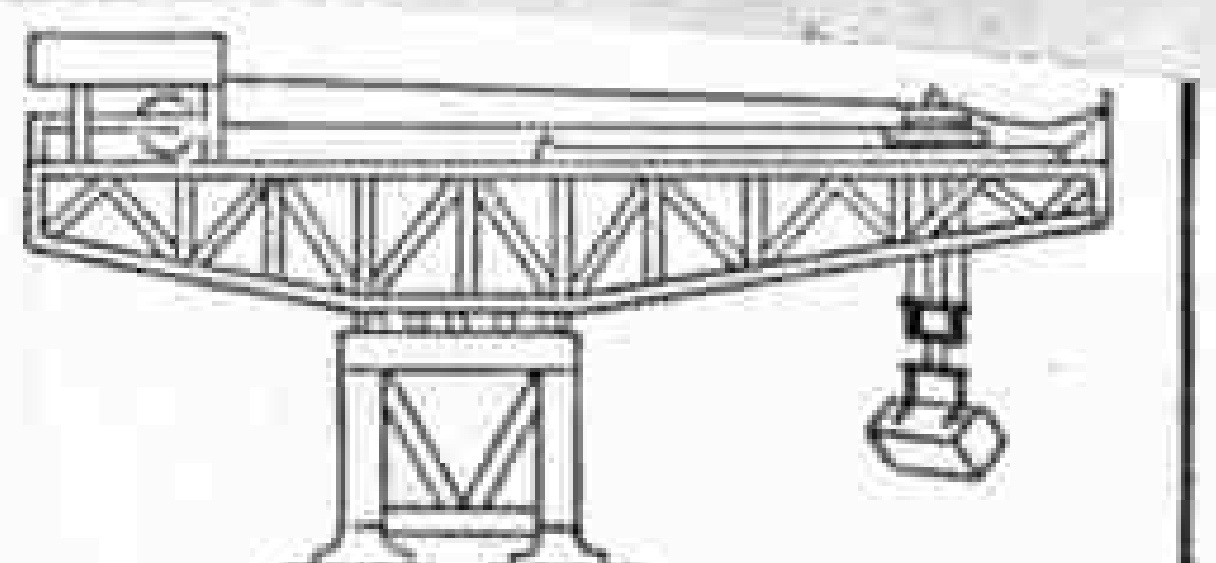
Obtainable at all leading toy dealers and stores. Send for free illustrated list of all Lott's products from Dept. M.M.

LOTT'S BRICKS LTD., WATFORD, HERTS., ENGLAND.

Get this WONDERFUL BOOK of TOYS

The Book of HORNBY TRAINS and MECCANO PRODUCTS
DINKY TOYS
9d
MECCANO LTD BINNS ROAD LIVERPOOL 13

Price 9d.
From your dealer

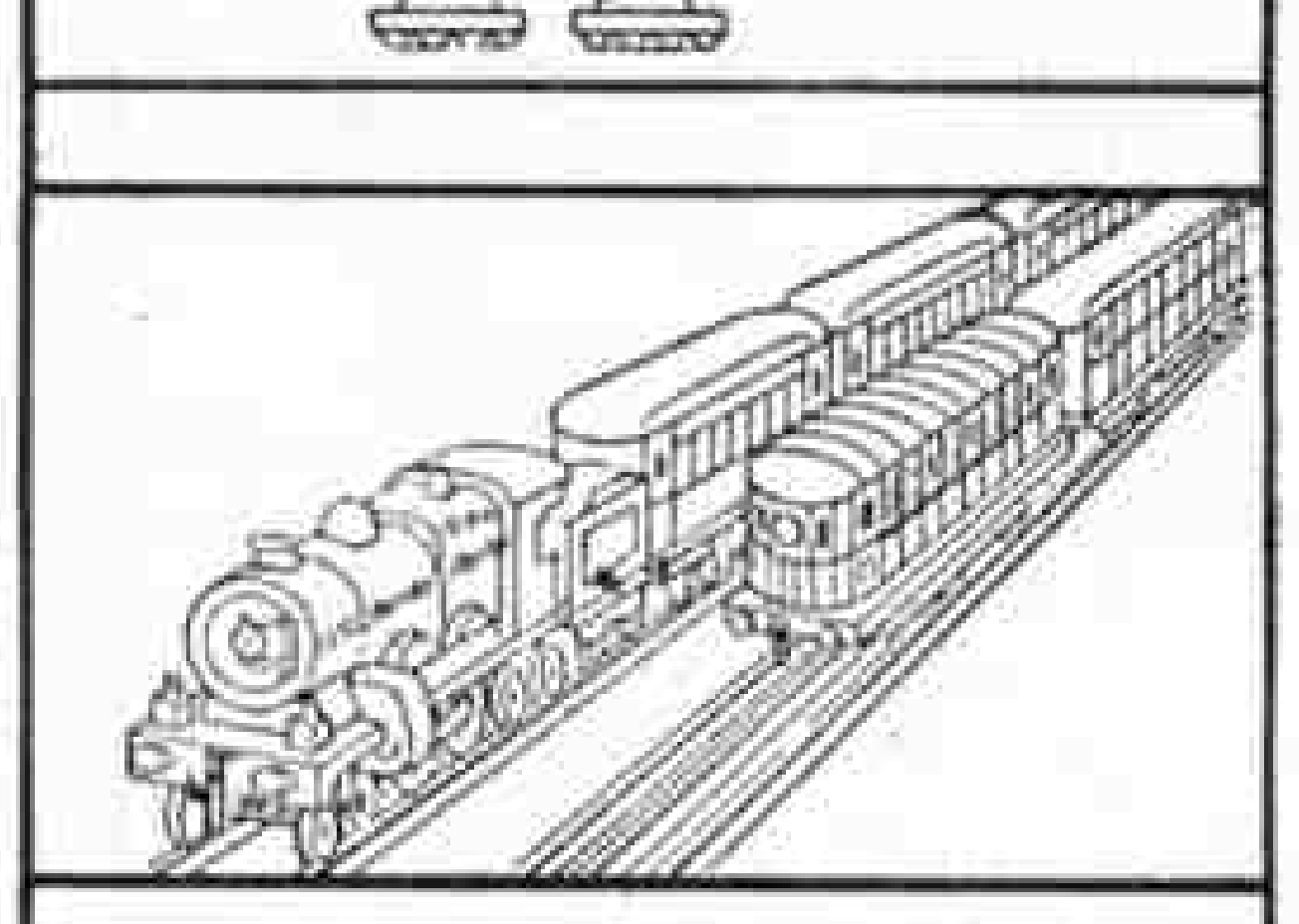


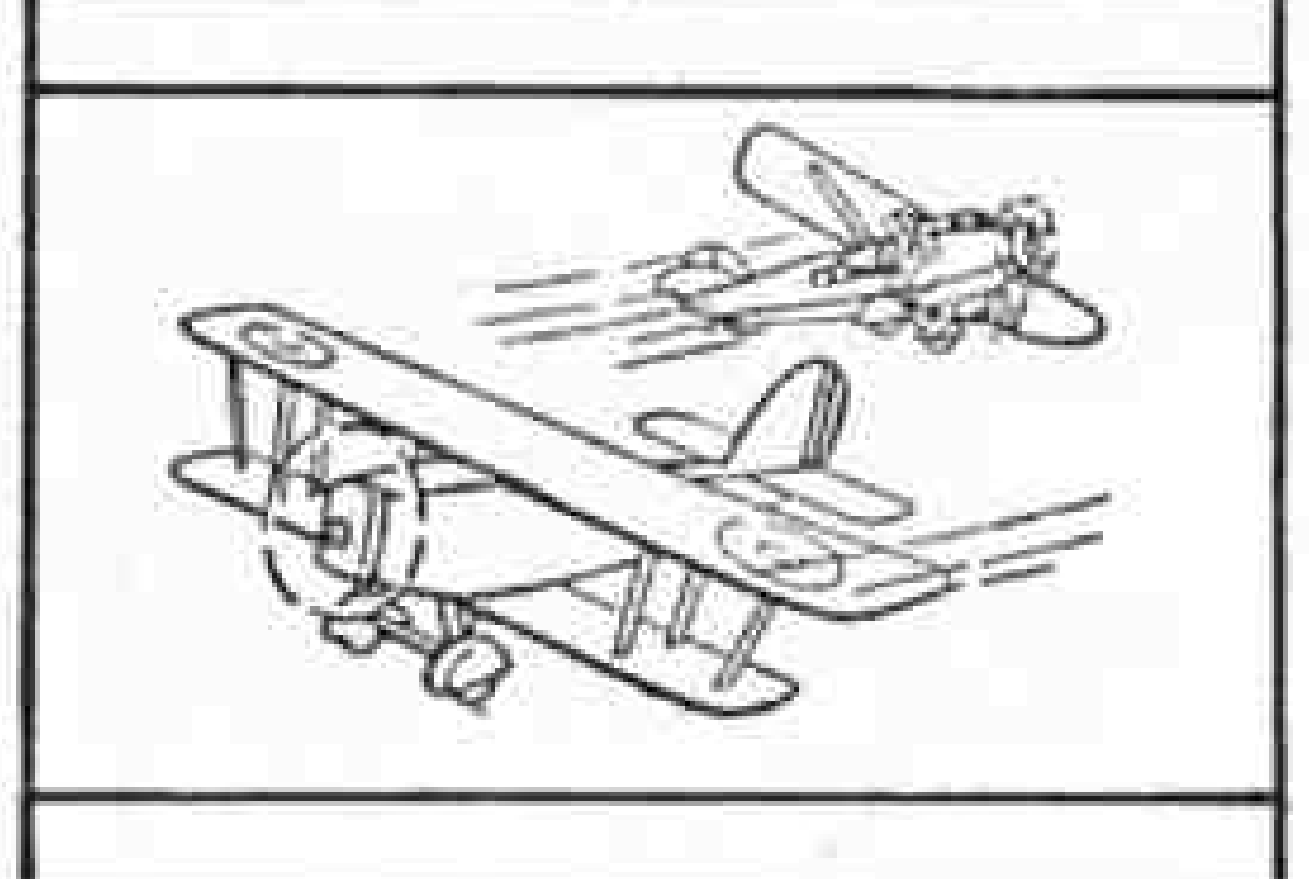
Brimful of Good News for Boys

The new "Book of Hornby Trains and Meccano Products" is the finest catalogue we have ever produced. It is beautifully printed in full colour throughout on finest quality white art paper, and its sixty pages contain the complete range of Meccano Products.

On the Meccano Outfit pages are examples of the fine models that can be built with the new-style parts finished in blue and gold. The Hornby Trains section (comprising thirty pages) will delight and satisfy the ever-increasing number of model railway enthusiasts. On other pages are featured Motor Car and Aeroplane Constructor Outfits, Dinky Builder, Kemex Chemical and Elektron Electrical Outfits, Hornby Speed Boats and Dinky Toys.

We hope that every boy in the country, and especially readers of the "M.M.," will make a point of securing a copy of this remarkable production without delay.

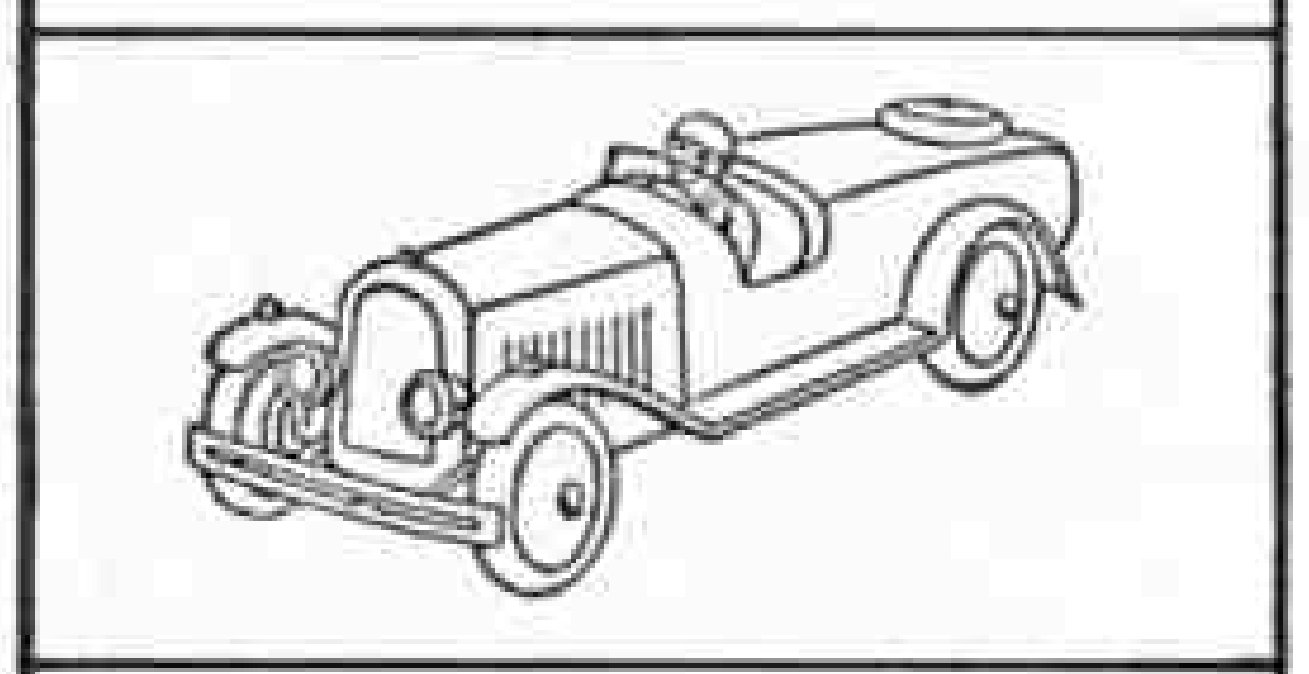




HOW TO OBTAIN THE BOOK

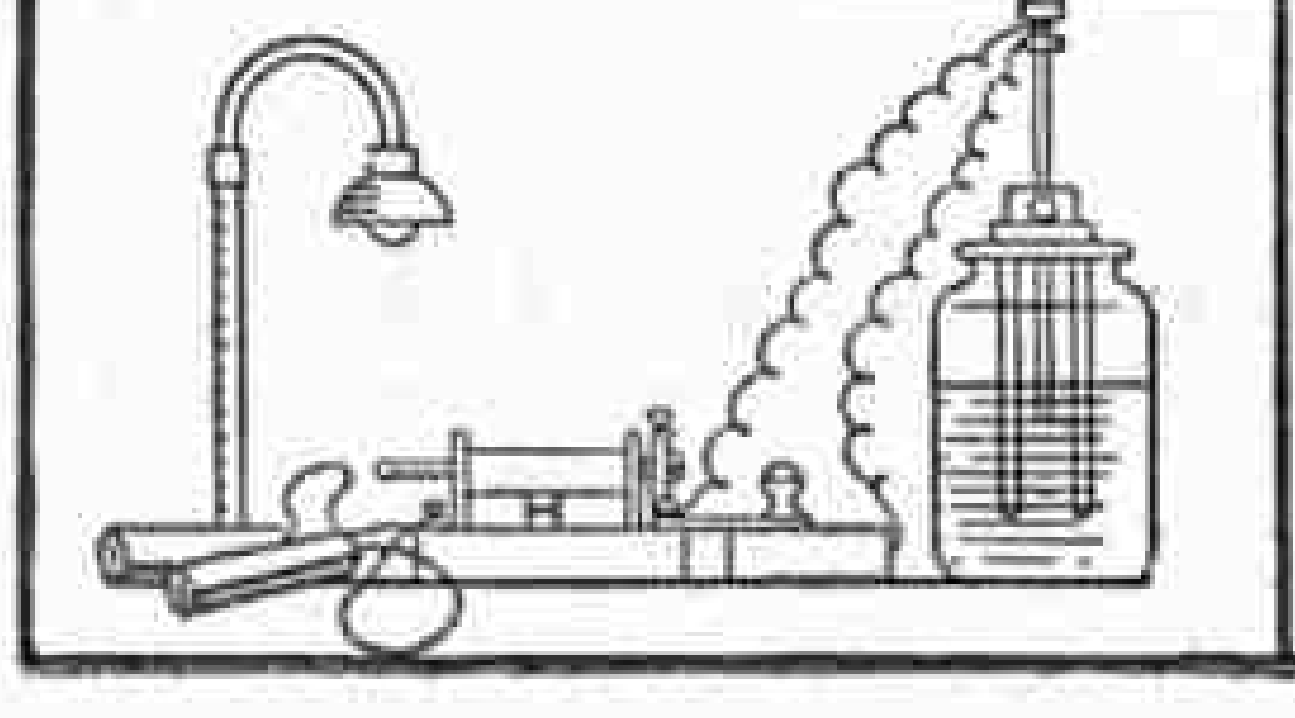
"The Book of Hornby Trains and Meccano Products" may be obtained from any Meccano dealer, price 9d. Alternatively, you can send in a remittance of 9d. to Meccano Limited (Dept. No. 70), Binns Road, Liverpool 13, and we will arrange for a copy of the book to be forwarded immediately, post free.

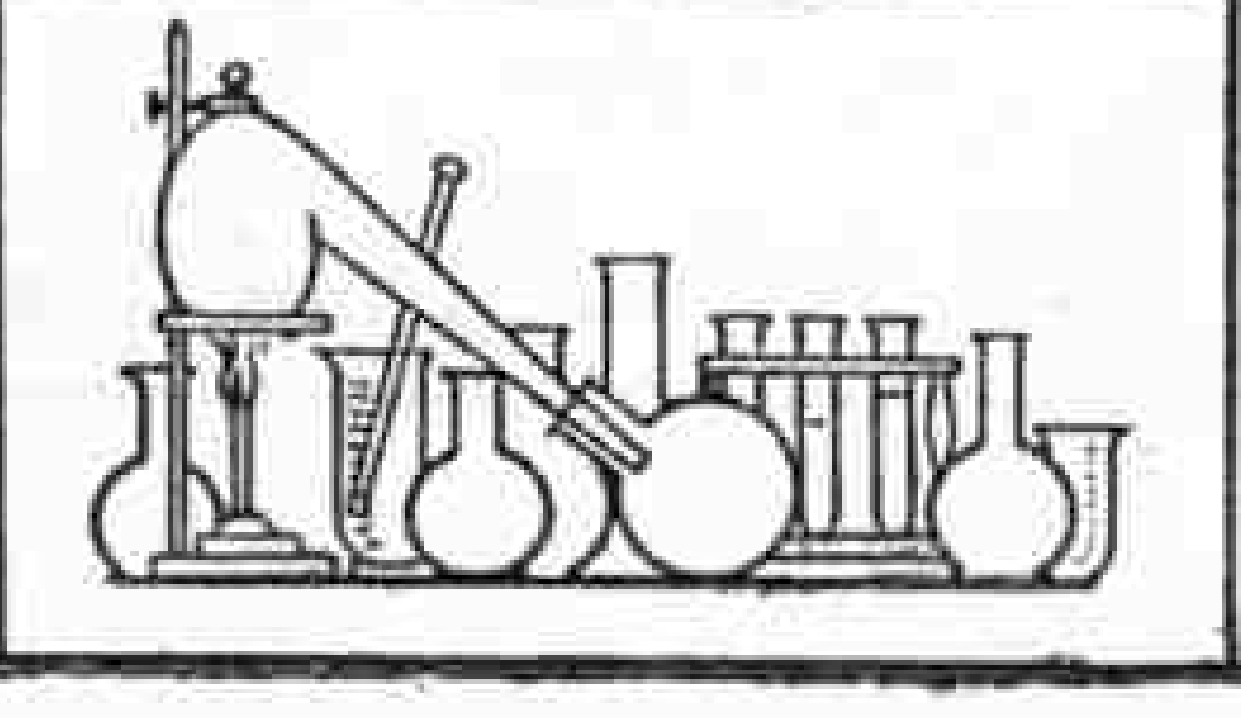
GET YOUR COPY TO-DAY

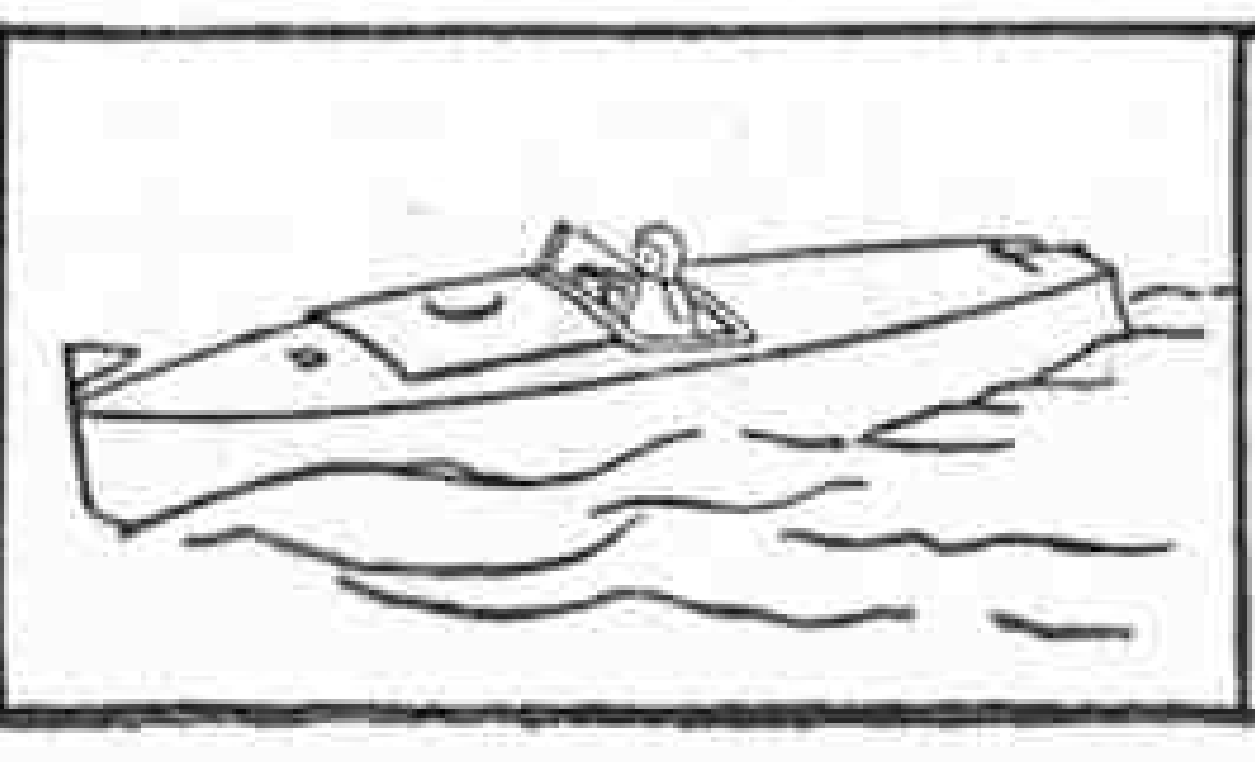


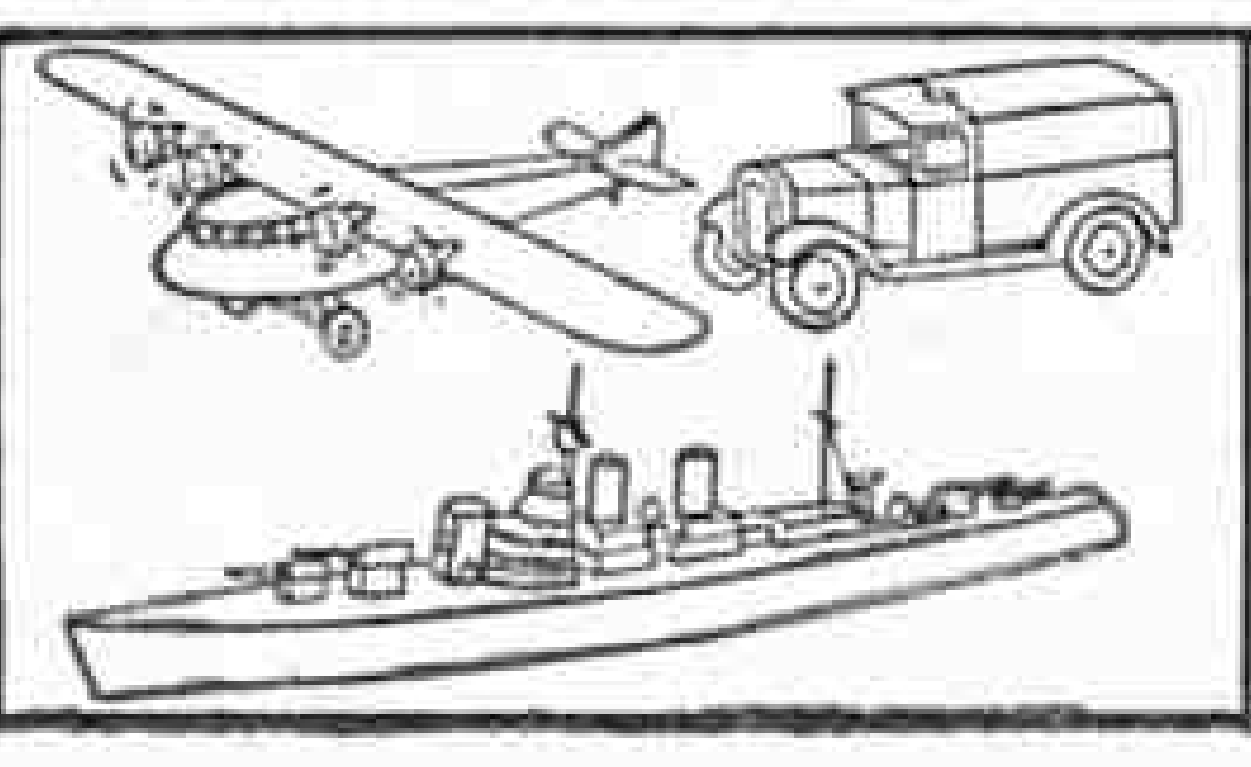
Published by

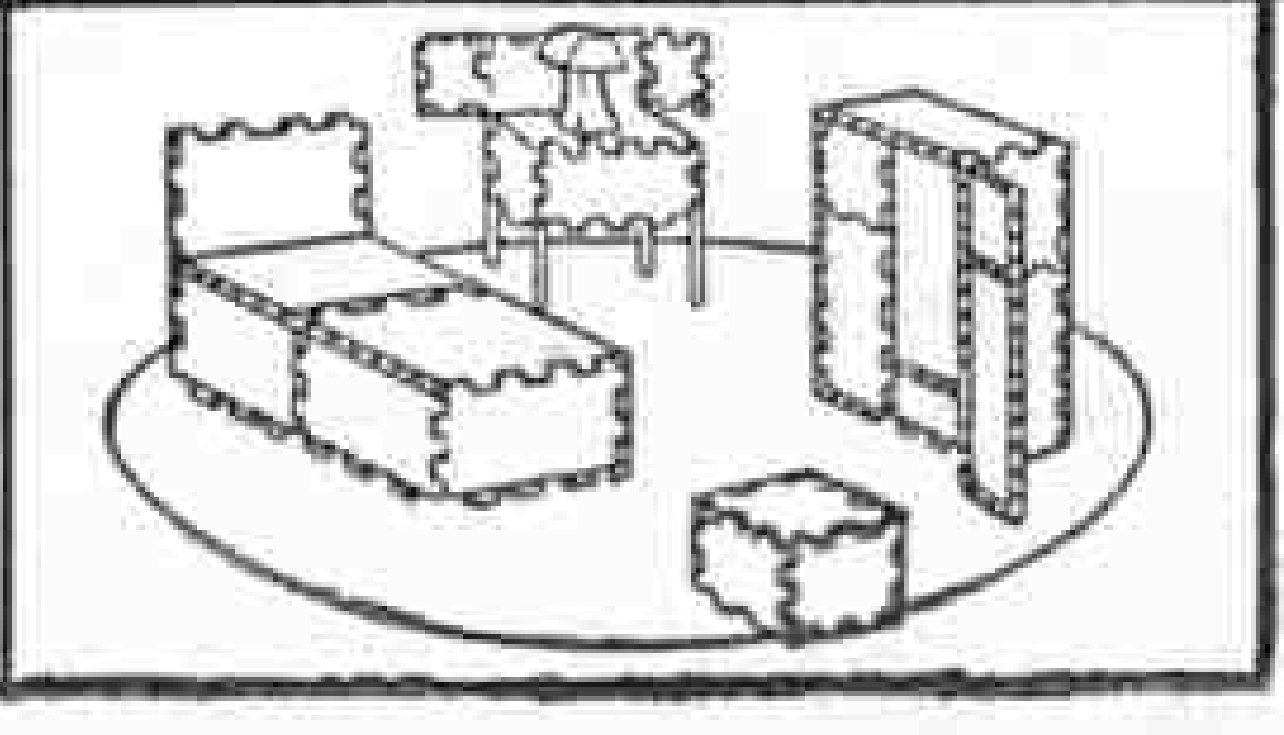
MECCANO LTD. (Dept. No. 70), BINNS ROAD, LIVERPOOL 13











Toys of
Quality
made by
Meccano Ltd.
Liverpool

HORNBY ROLLING STOCK

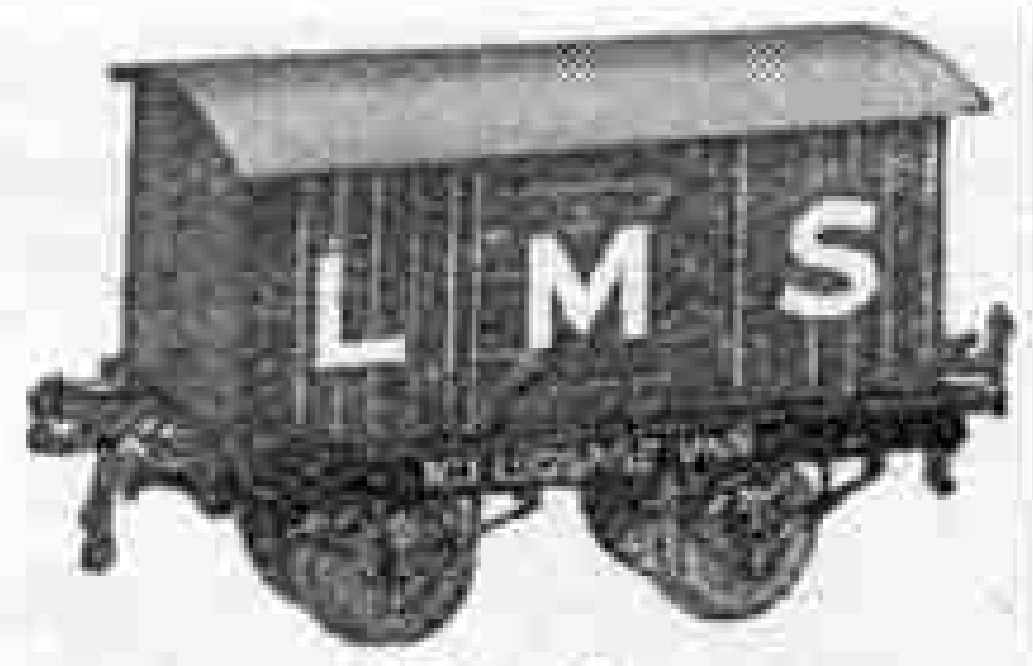
Hornby Rolling Stock includes almost every type in use on the big railways, and a selection of the splendid range available is illustrated on this page. The various items are modelled on realistic lines, strongly built and beautifully finished.

Ask your dealer to show you the full range of Hornby Rolling Stock.

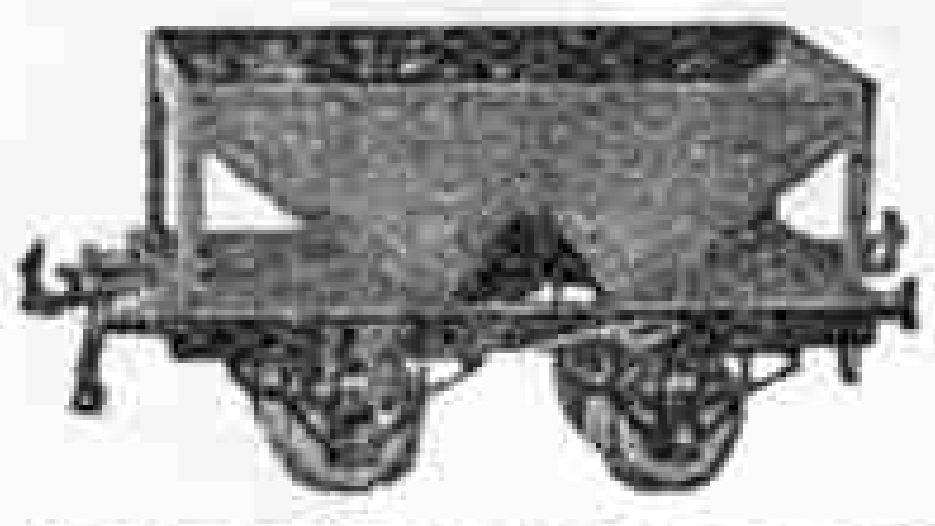
No. I PETROL TANK WAGON "PRATTS"
Finished in buff. Price 2/–

BRAKE VAN (French Type)
Lettered "NORD," Beautifully finished in colours. Opening doors. Price 4/–

CARR'S BISCUIT VAN
Finished in blue, with opening doors. Price 2/9

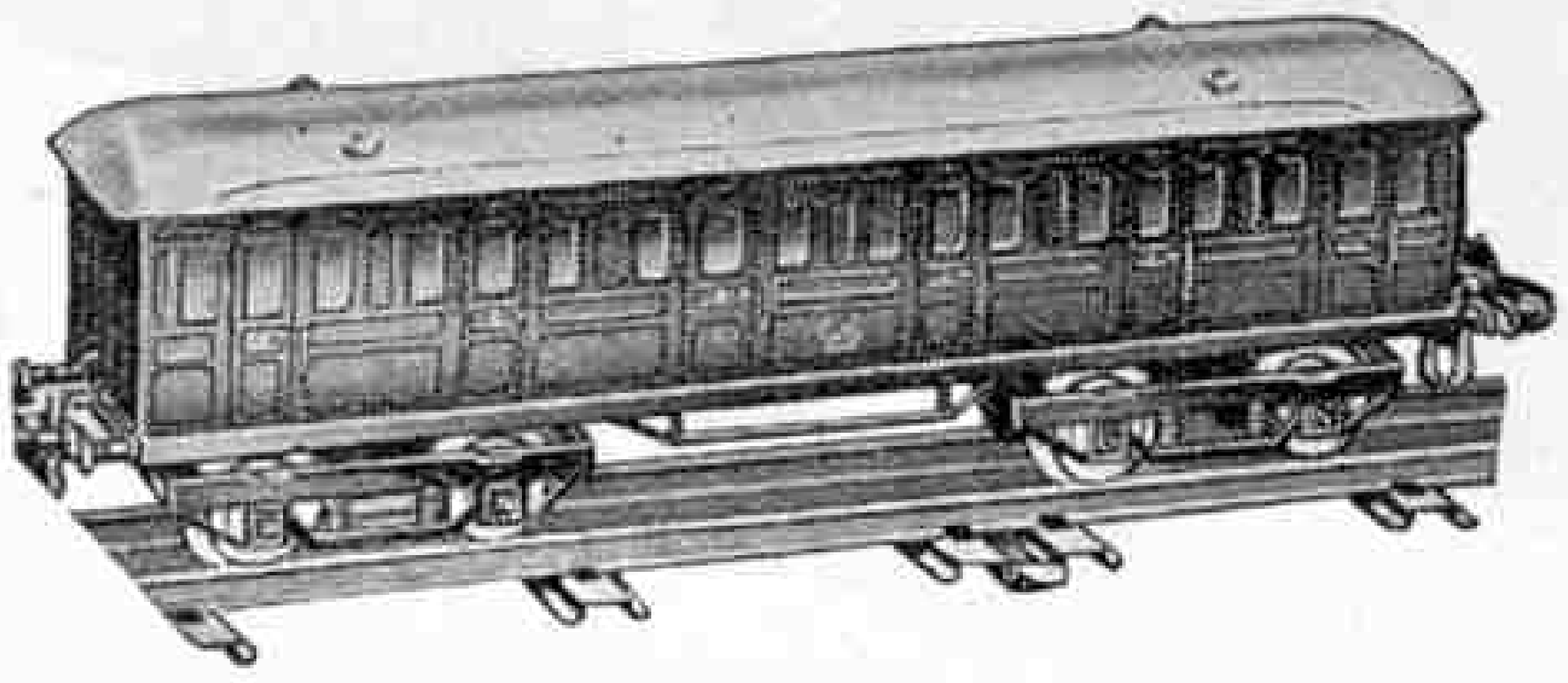


***No. I LUGGAGE VAN**
With opening doors. Price 2/9



***HOPPER WAGON**
Mechanically unloaded. Finished in green. Price 3/6

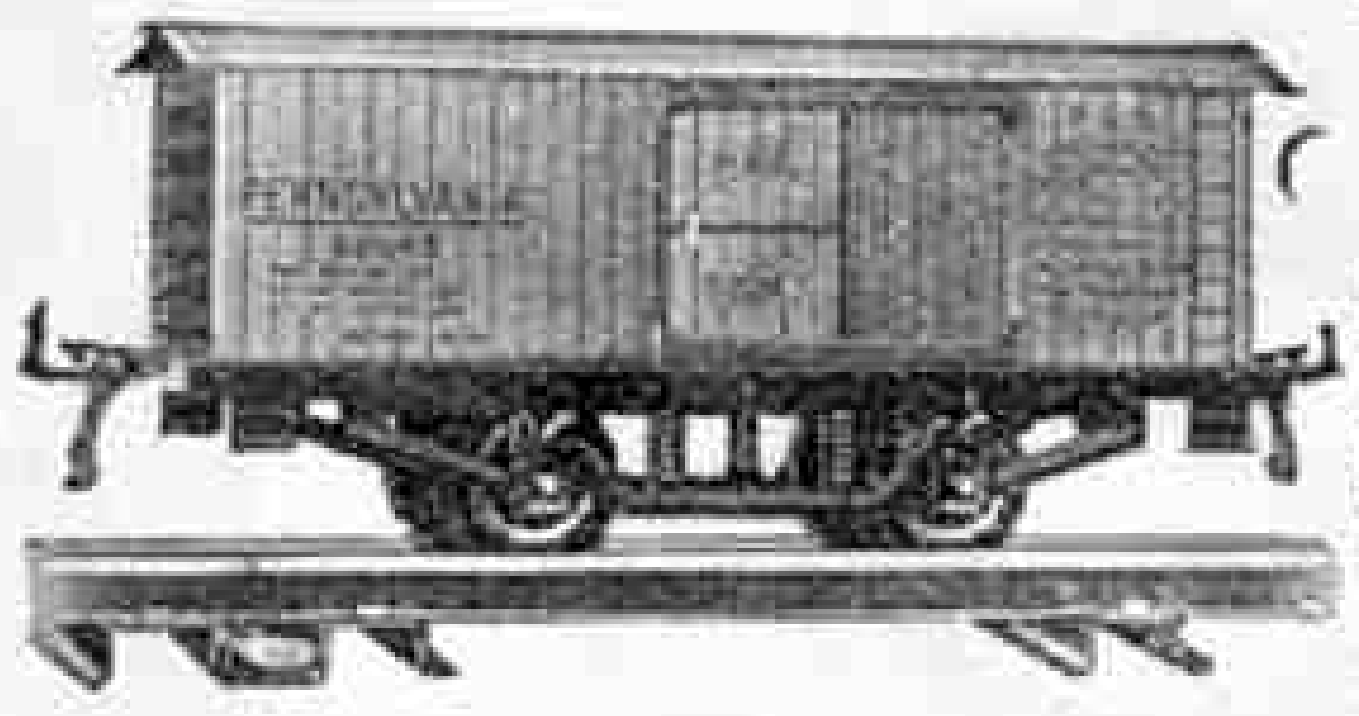
JACOB'S BISCUIT VAN
Finished in brown, with opening doors. Price 2/9



METROPOLITAN COACH, C
As supplied with Metropolitan Clockwork Train Set ... ... Price 7/6

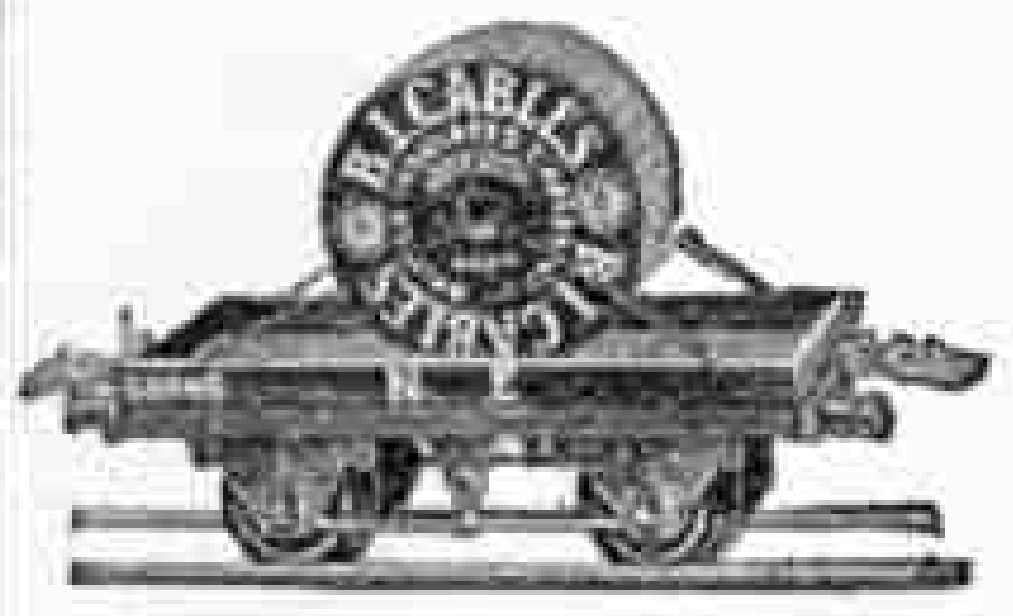
METROPOLITAN COACH, E
As supplied with E36 Metropolitan Electric Train Set ... Price 11/6

MO PETROL TANK WAGON "Shell Mex"
Finished in cream with lettering in black. Price 1/–



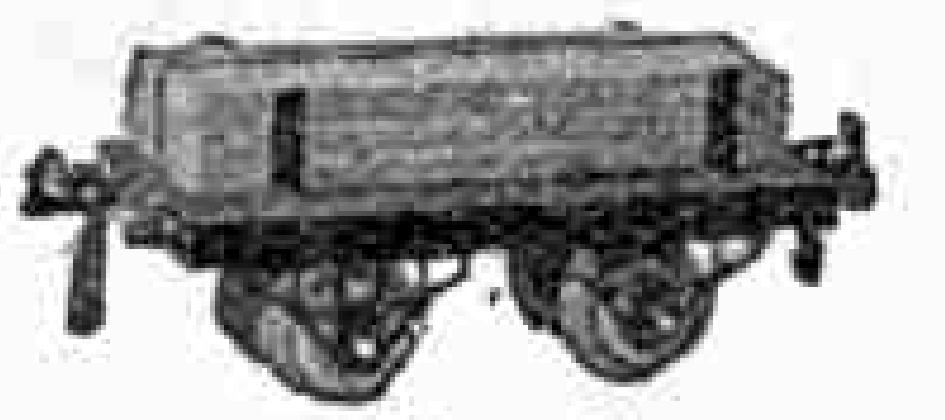
BOX CAR, American Type
This is a model of the type in use on American railways. Price 2/6

TARPAULIN SHEETS
Lettered L.M.S., G.W., N.E. or S.R. For fitting to Hornby Wagons. Price 2d.



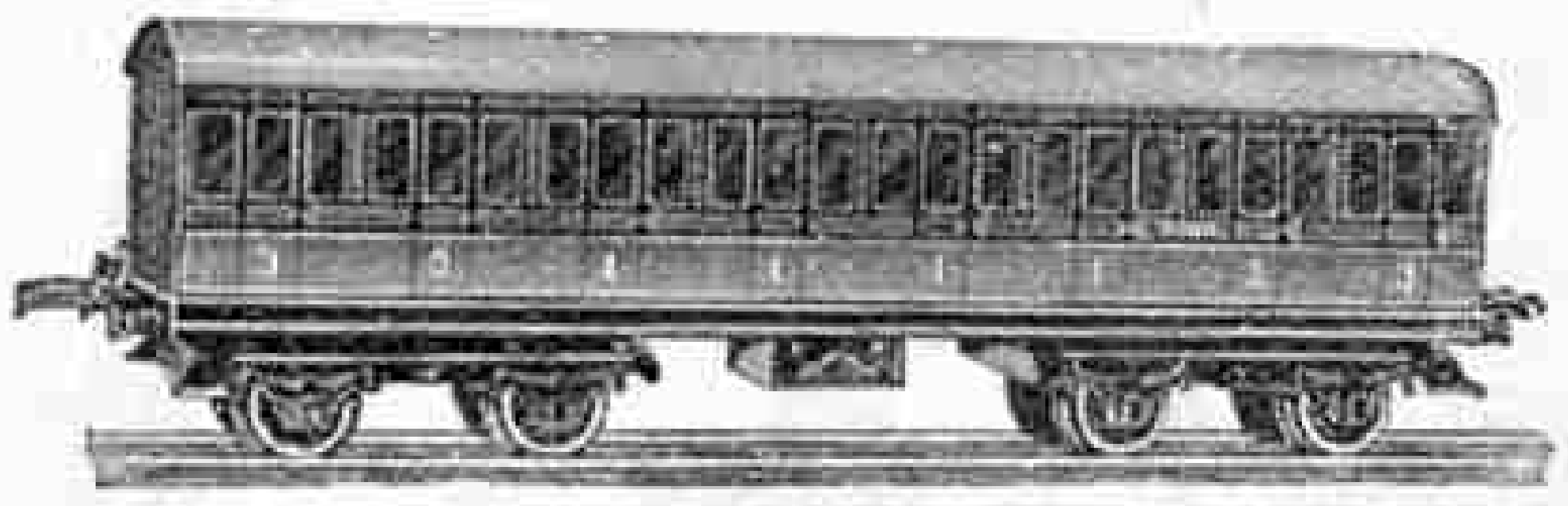
***FLAT TRUCK**
Without Cable Drum. Price 1/6
Complete with Cable Drum ... Price 1/9

CABLE DRUM
(British Insulated Cables Ltd.) ... Price 3d.

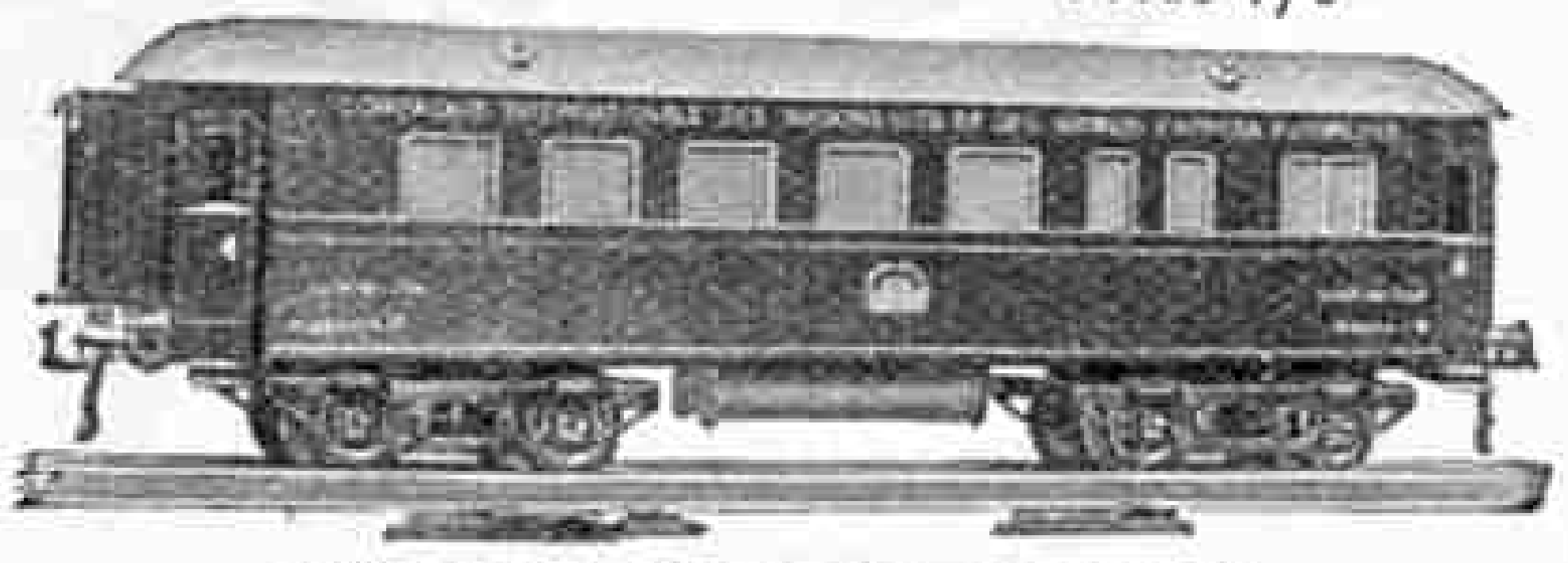


No. I TIMBER WAGON
Beautifully finished. Price 1/6

TROLLEY WAGON
Finished in red and green. Suitable for 2 ft. radius rails only ... ... Price 3/11

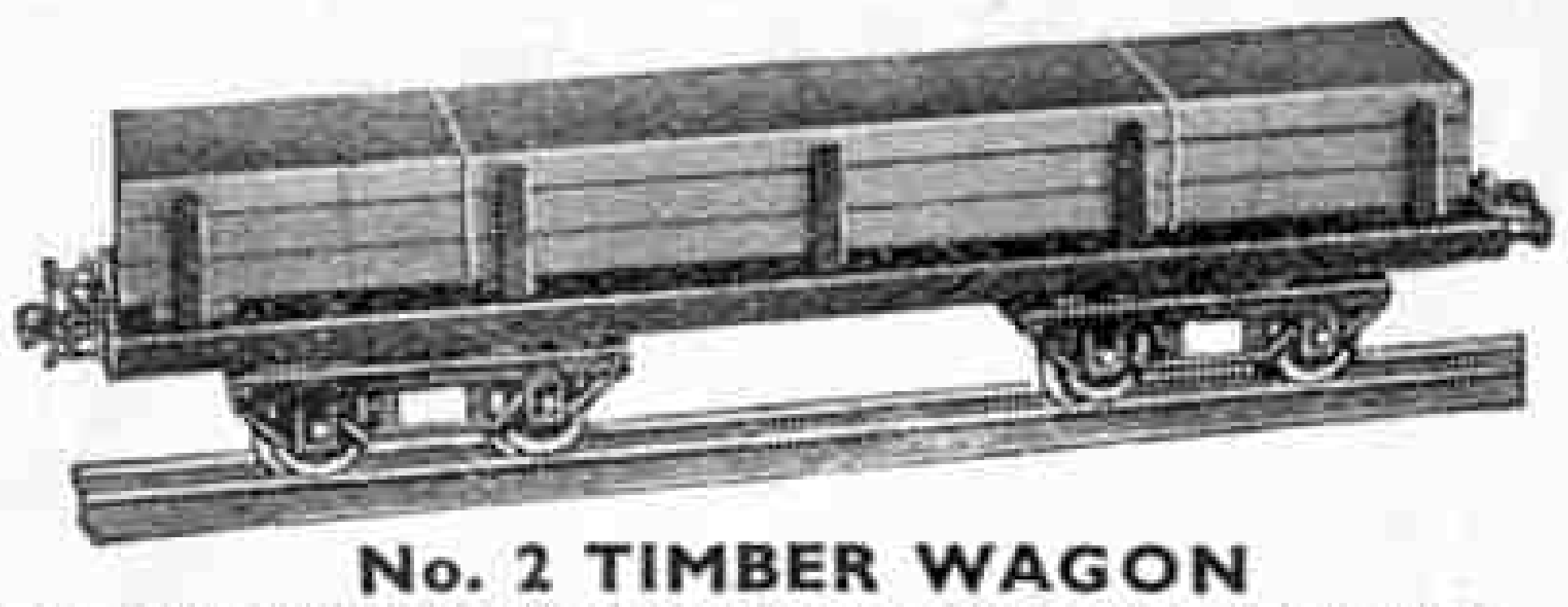


***No. 2 PASSENGER COACH**
Suitable for 2 ft. radius rails only. First-third, or Brake-third. ... ... Price 7/6

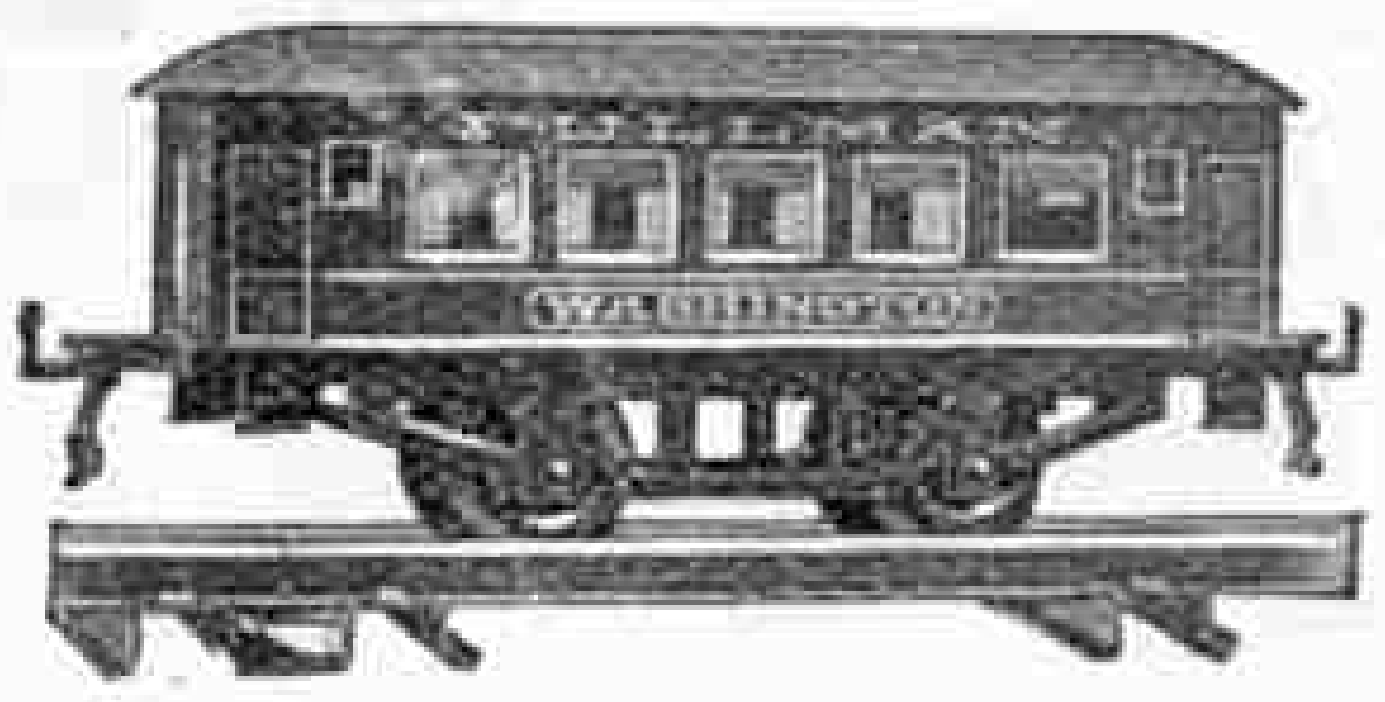


RIVIERA "BLUE" COACH
"Dining" or "Sleeping"
This is a beautiful model, substantially built and well finished. Suitable for 2 ft. radius rails only. Price 12/6

No. 3 Continental "MITROPA" COACH
Similar in design to the above. Beautifully finished in red with white roof, and lettered "Mitropa" in gold ... ... Price 12/6



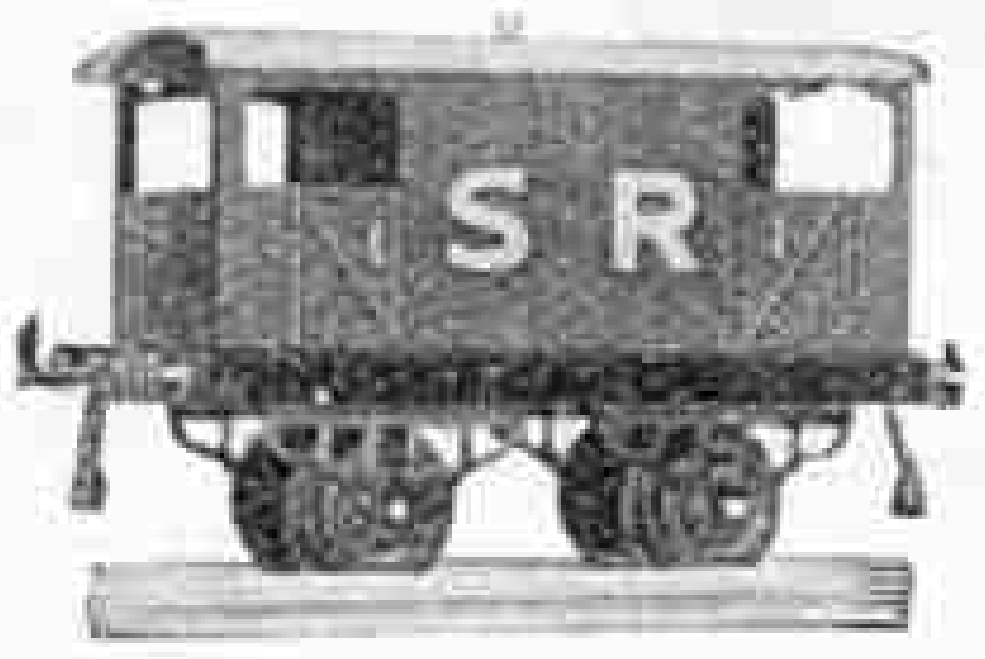
No. 2 TIMBER WAGON
Beautifully enamelled in green and red. Suitable for 2 ft. radius rails only ... ... Price 2/6



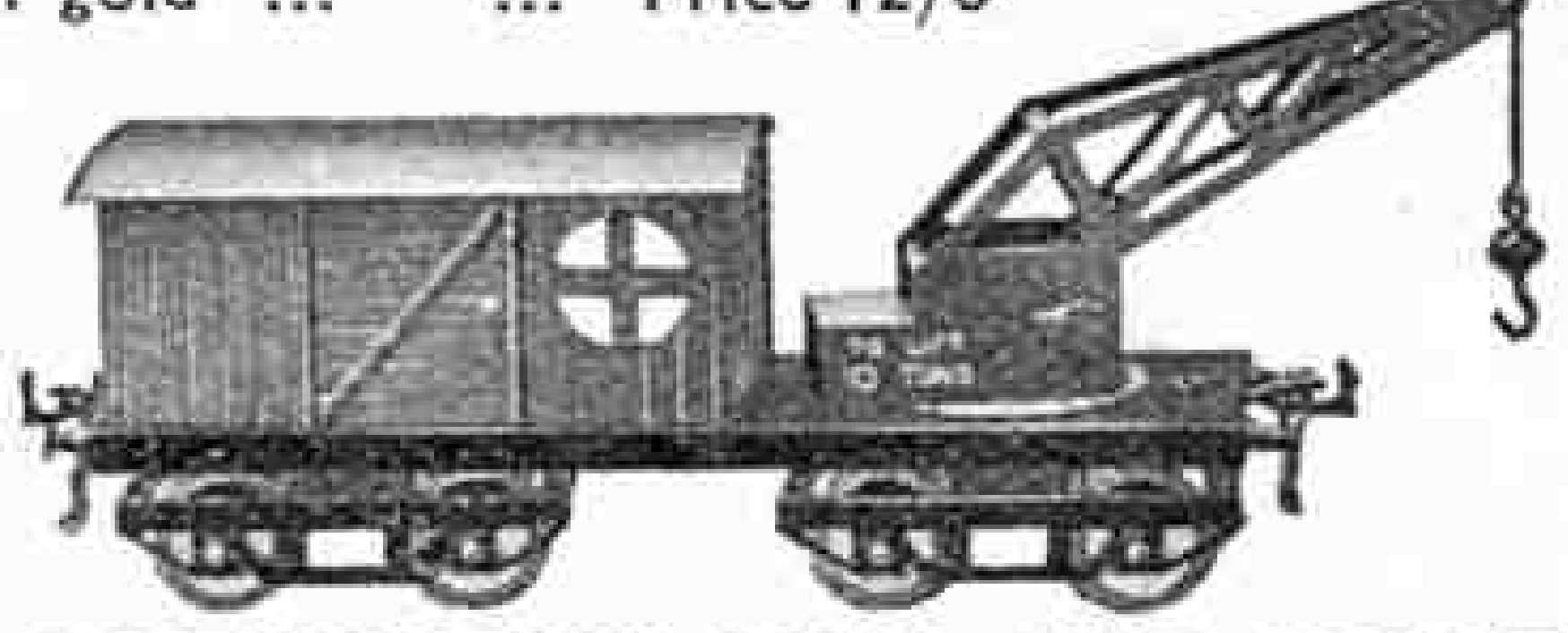
PULLMAN CAR
Imported from U.S.A. Product of Meccano factories.

American Type (as illustrated). Yellow or green, with orange or bright red roof. Lettered "Washington" or "Madison" ... Price 1/6

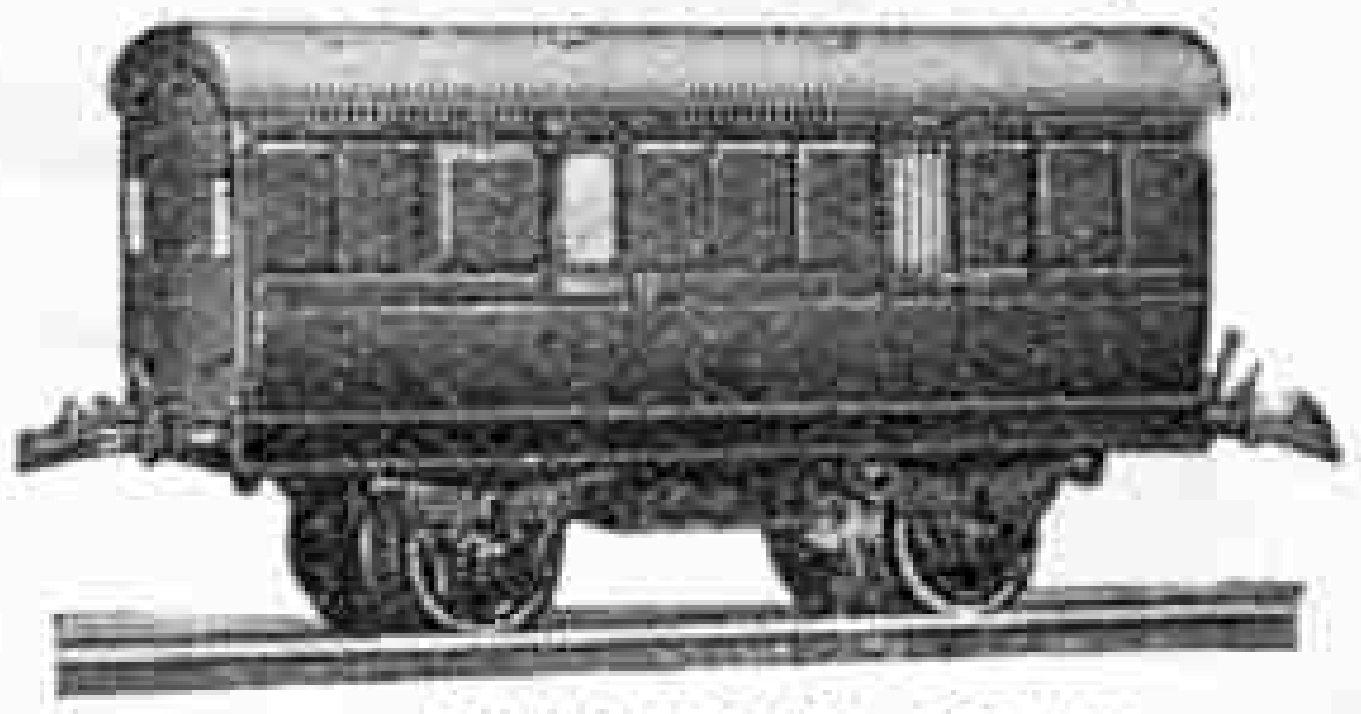
Continental Type. No. O. Red with white roof. Letered "Mitropa." Price 1/6



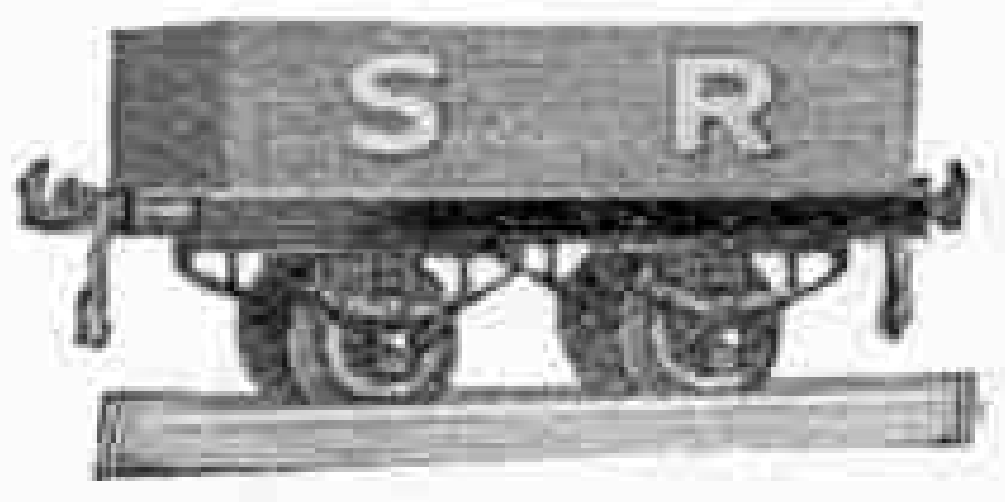
BRAKE VAN
Finished in brown, with opening doors. Obtainable with N.E. or S.R. lettering. Price /11



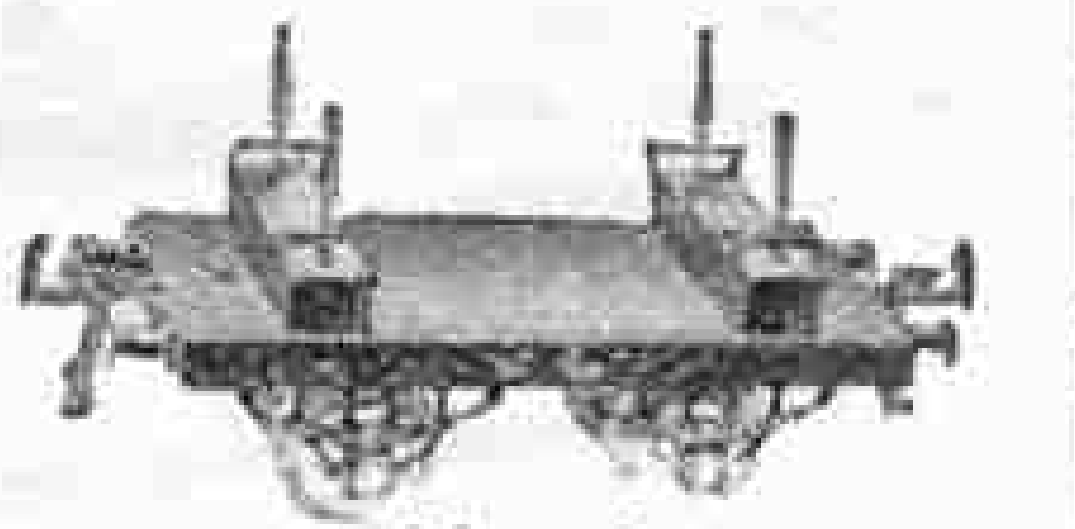
***BREAKDOWN VAN AND CRANE**
Beautifully coloured in green and blue, with opening doors. Suitable for 2 ft. radius rails only. Price 5/11



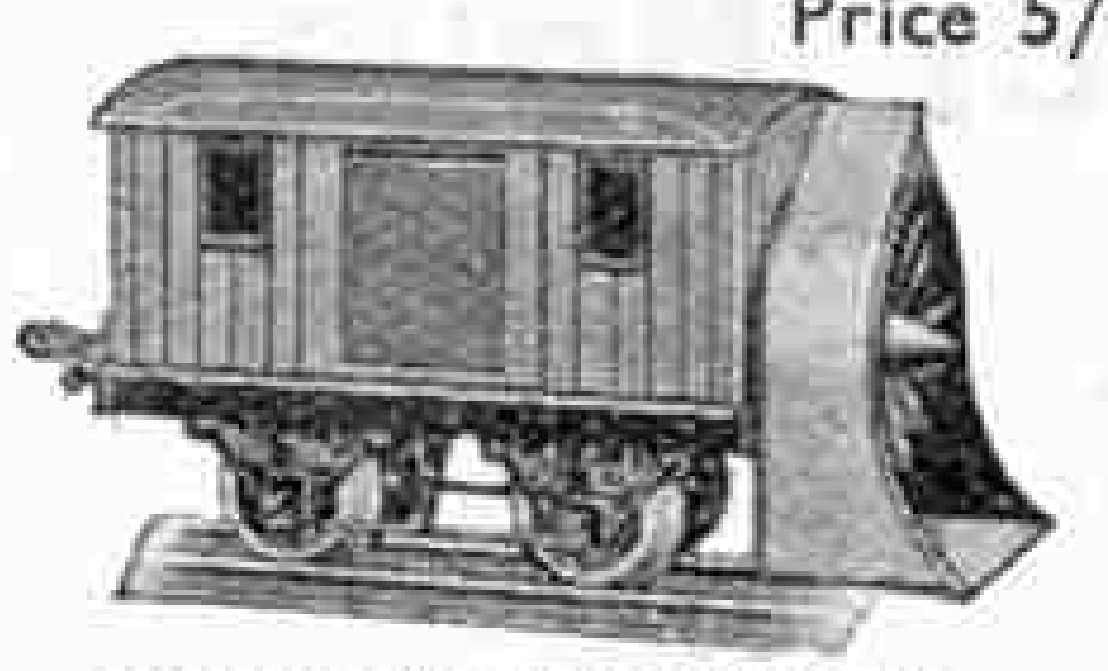
GUARD'S VAN
In colours to represent L.M.S.R., L.N.E.R., G.W.R. or S.R. Price 2/6



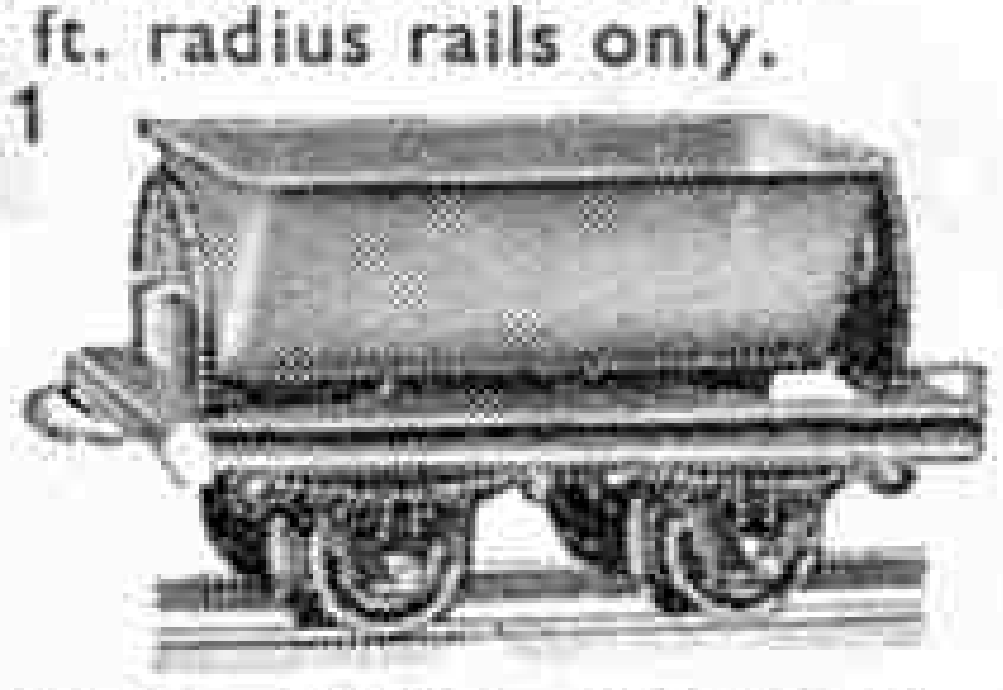
***No. O HORNBY WAGON** Price 1/6
No. I HORNBY WAGON (illustrated) Price 1/9



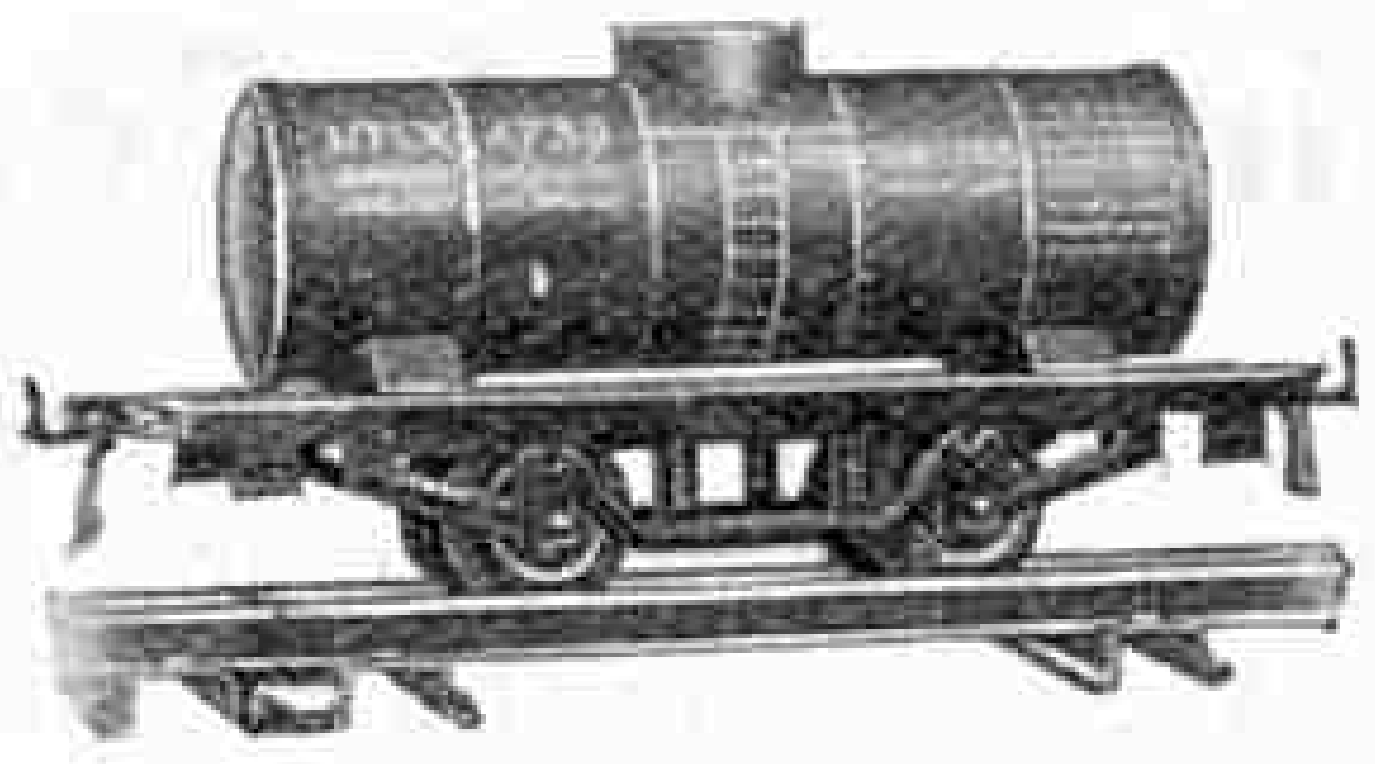
No. I LUMBER WAGON
Fitted with bolsters and stanchions. Price 1/6



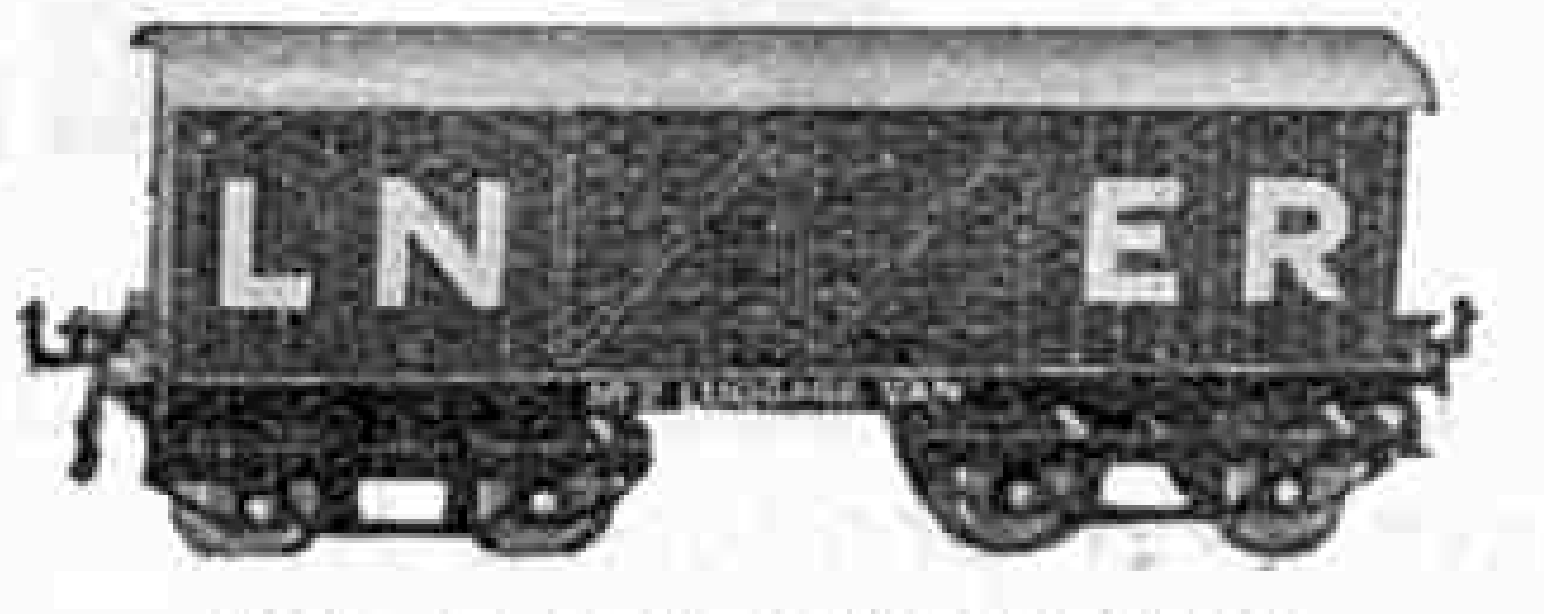
SNOW PLOUGH
With revolving plough. Price 3/9



MO SIDE TIPPING WAGON
Finished in bright yellow, tips either side. Price 1/-

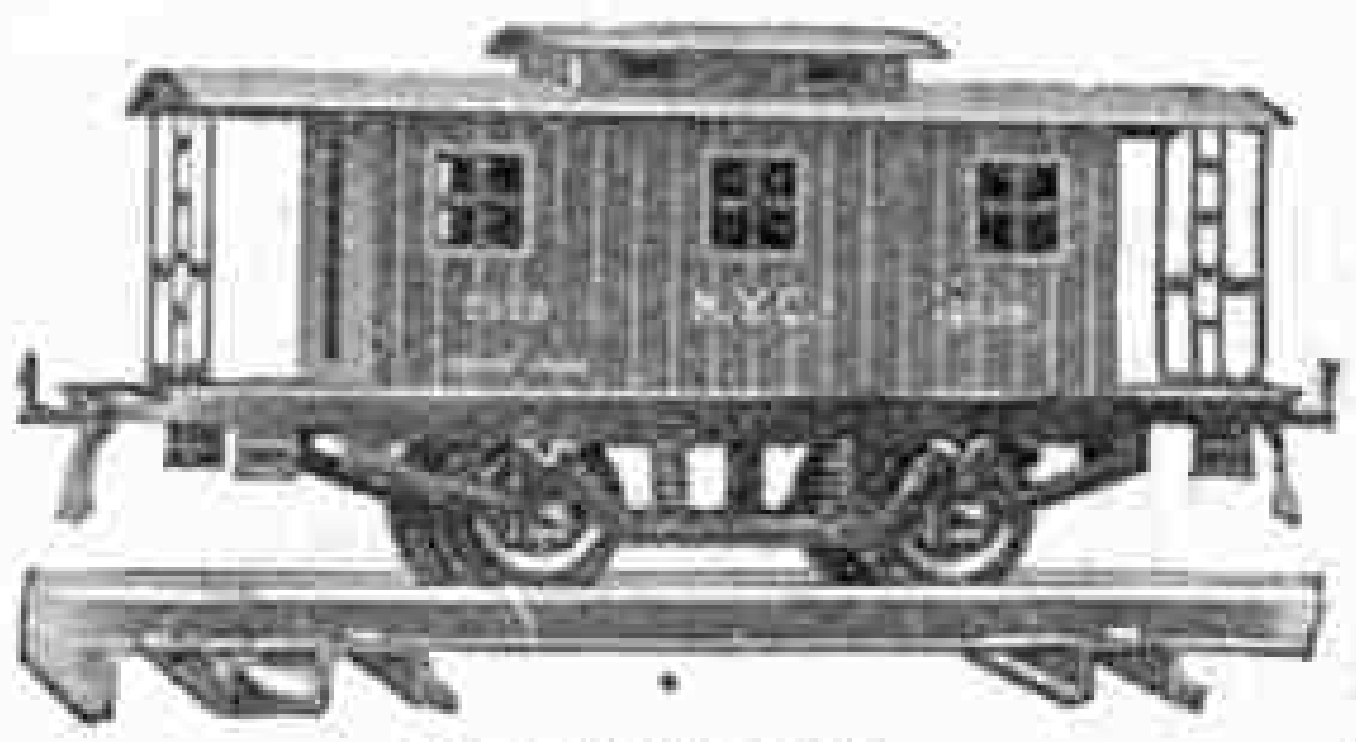


TANK CAR, American Type
Model of the type of oil tank car used in America ... Price 1/9

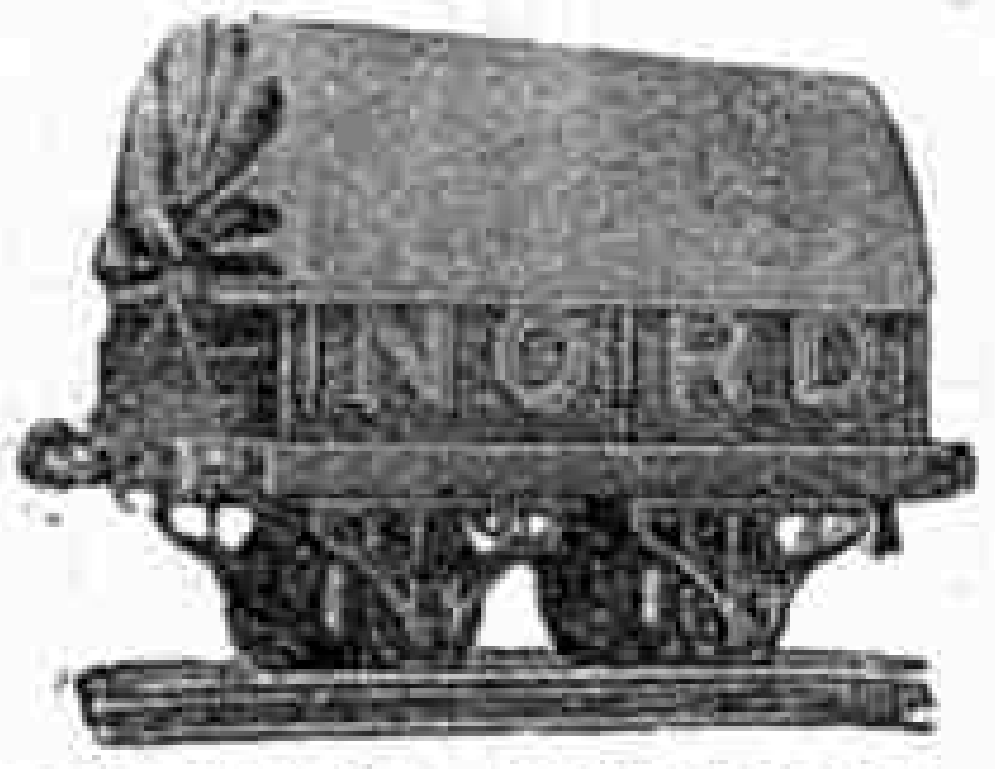


***No. 2 LUGGAGE VAN**
Fitted with double doors. Suitable for 2 ft. radius rails only. Price 4/6

***No. 2 CATTLE TRUCK**
Fitted with double doors. Suitable for 2 ft. radius rails only ... Price 4/6



CABOOSE (American Type)
Modelled on the type of brake van used on American railways. Price 2/6

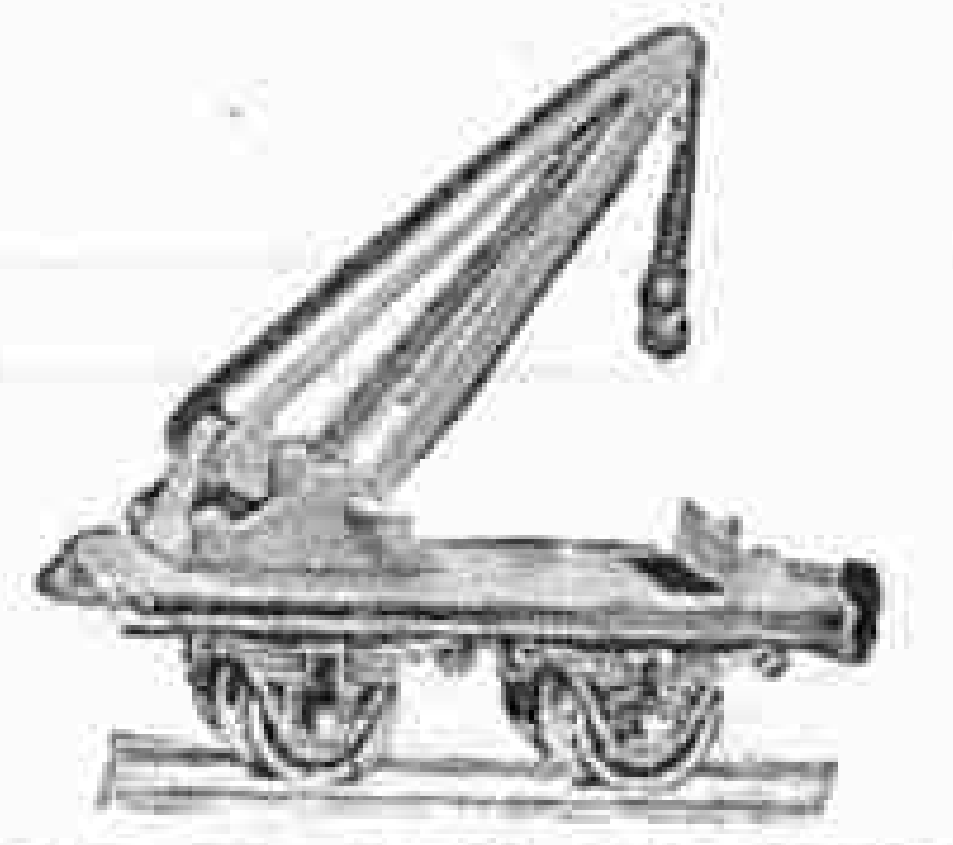


COVERED WAGON (French Type)
This wagon is fitted with frame and sheet. Lettered "NORD" ... Price 2/6

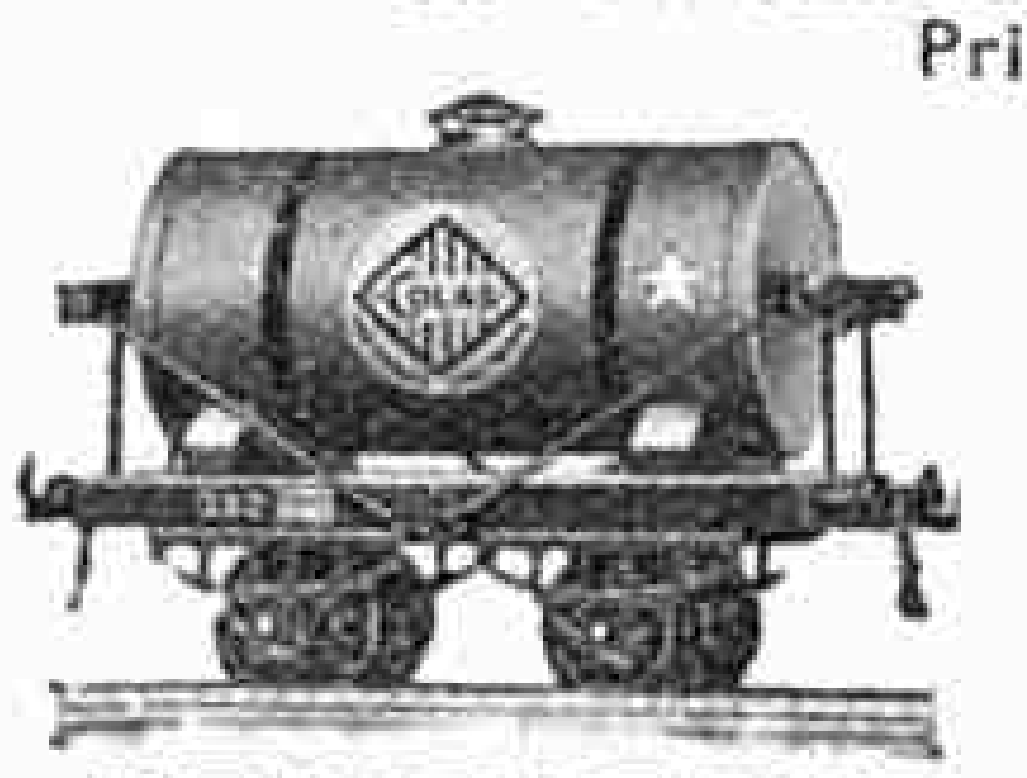
MILK TANK WAGON "UNITED DAIRIES"
Finished in blue and white. ... Price 4/6

CEMENT WAGON
The door at the top opens. Finished in bright red ... Price 2/6

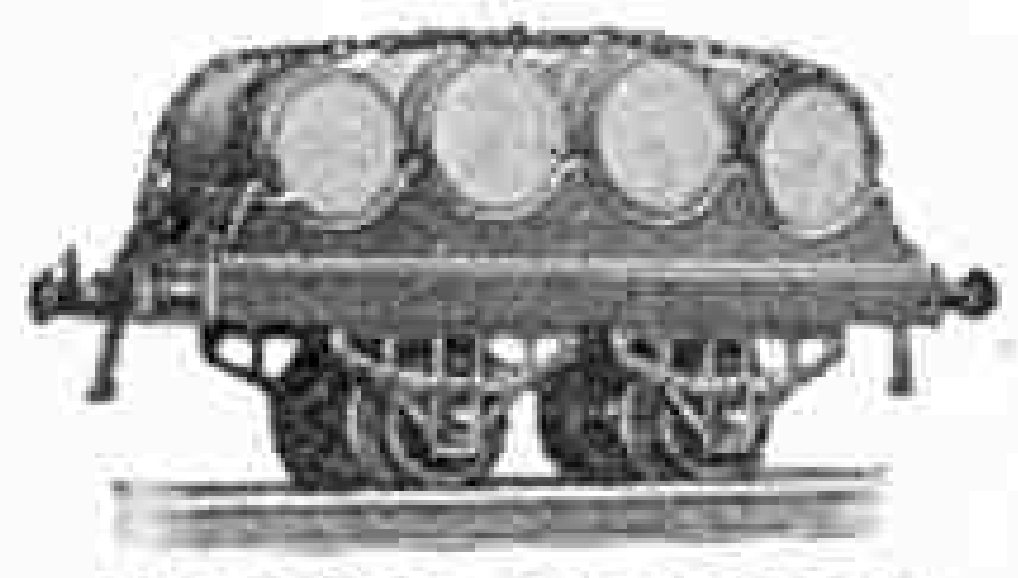
CHOCOLATE VAN "CADBURY'S"
Beautifully finished in blue with white roof. Price 2/9



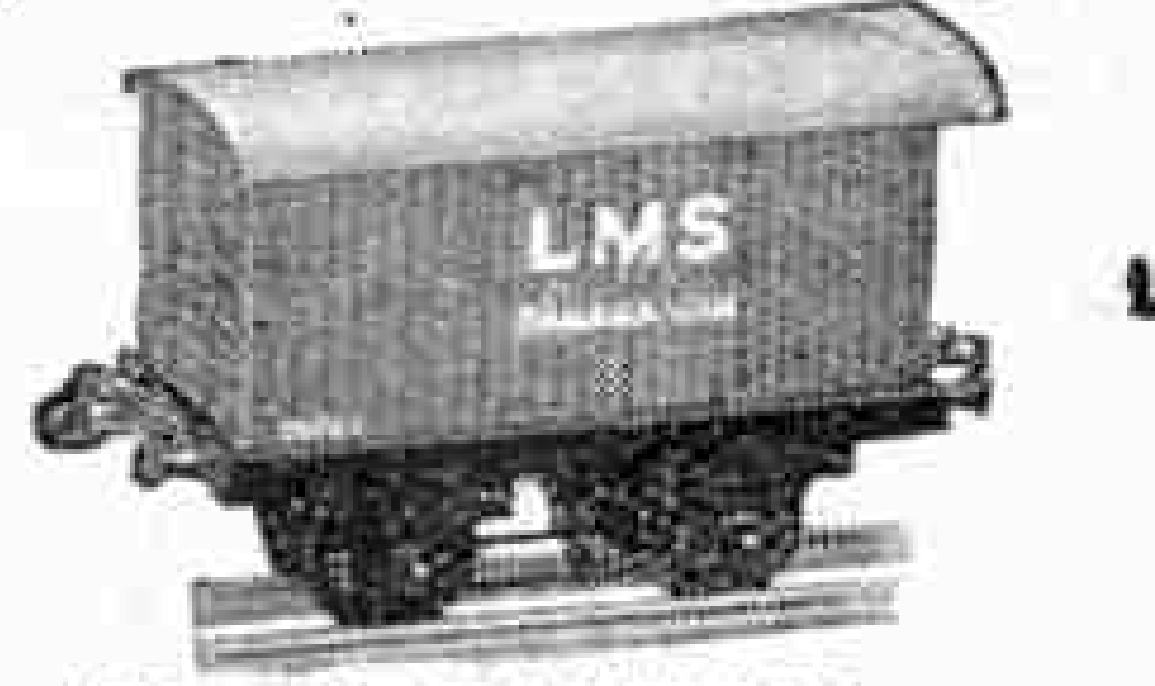
MO CRANE TRUCK
Finished in blue. Crane revolves on its base. Price 1/–



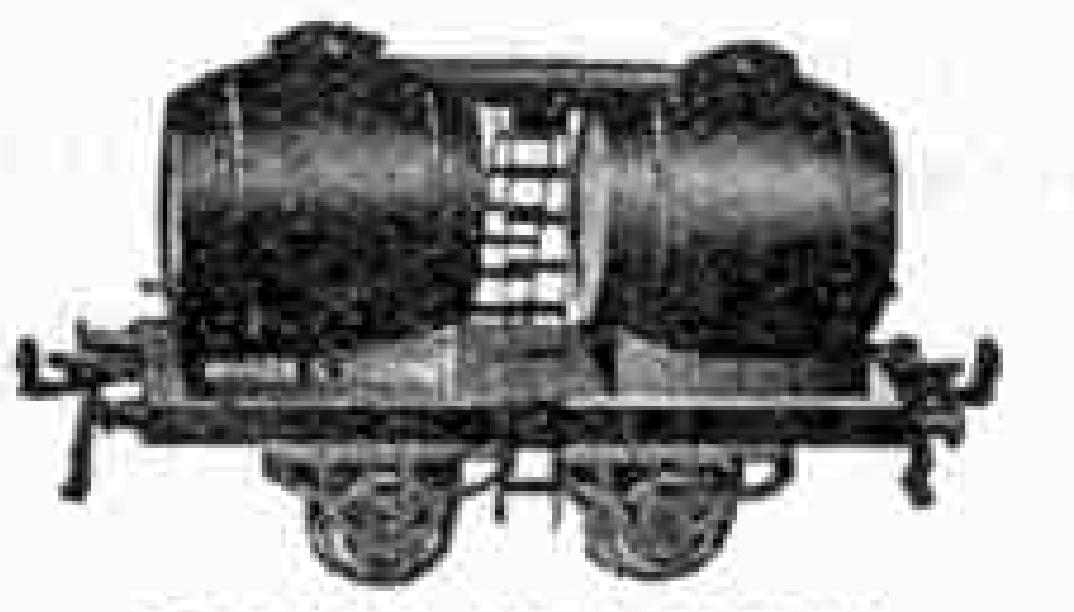
BITUMEN TANK WAGON "COLAS"
Finished in blue Price 3/6



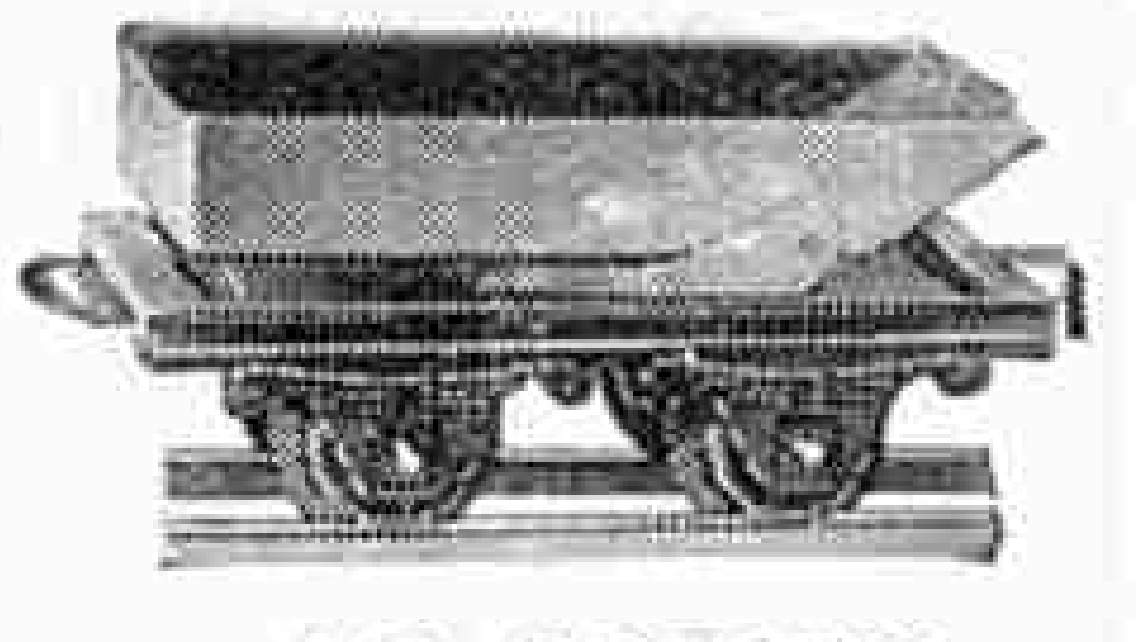
BARREL WAGON
This is a model of a type of wagon used in France and other European countries ... Price 2/6



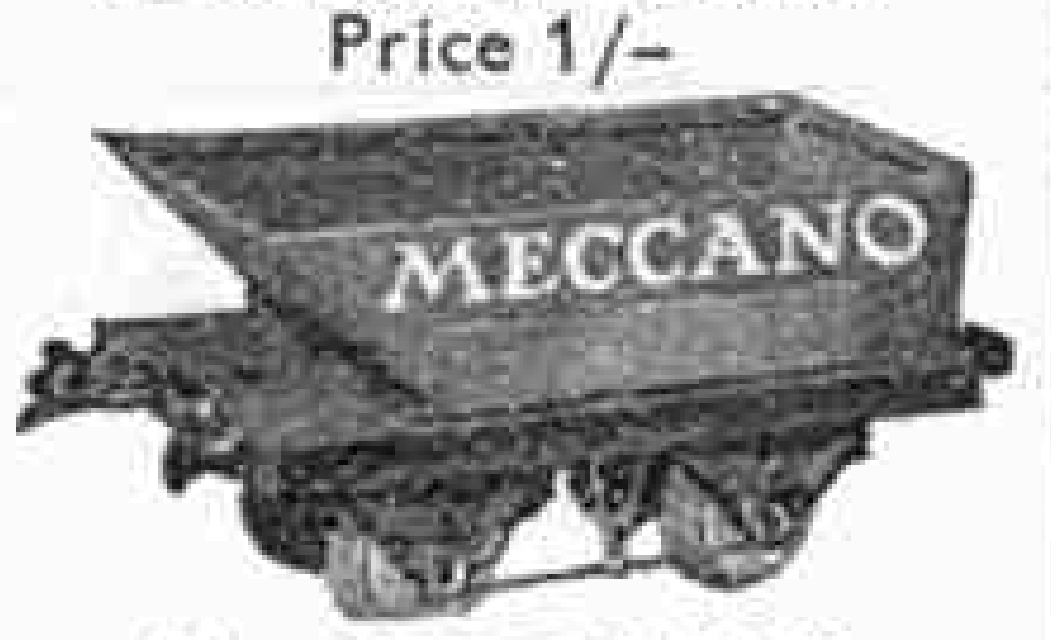
No. O BANANA VAN
Finished in grey. Lettered L.M.S. only ... Price 1/9



WINE WAGON DOUBLE BARREL
This model represents the French double-barrel type of Wine Wagon Beautiful finish. Price 4/6



MO ROTARY TIPPING WAGON
Finished in green. Container revolves and tips at any angle ... Price 1/–



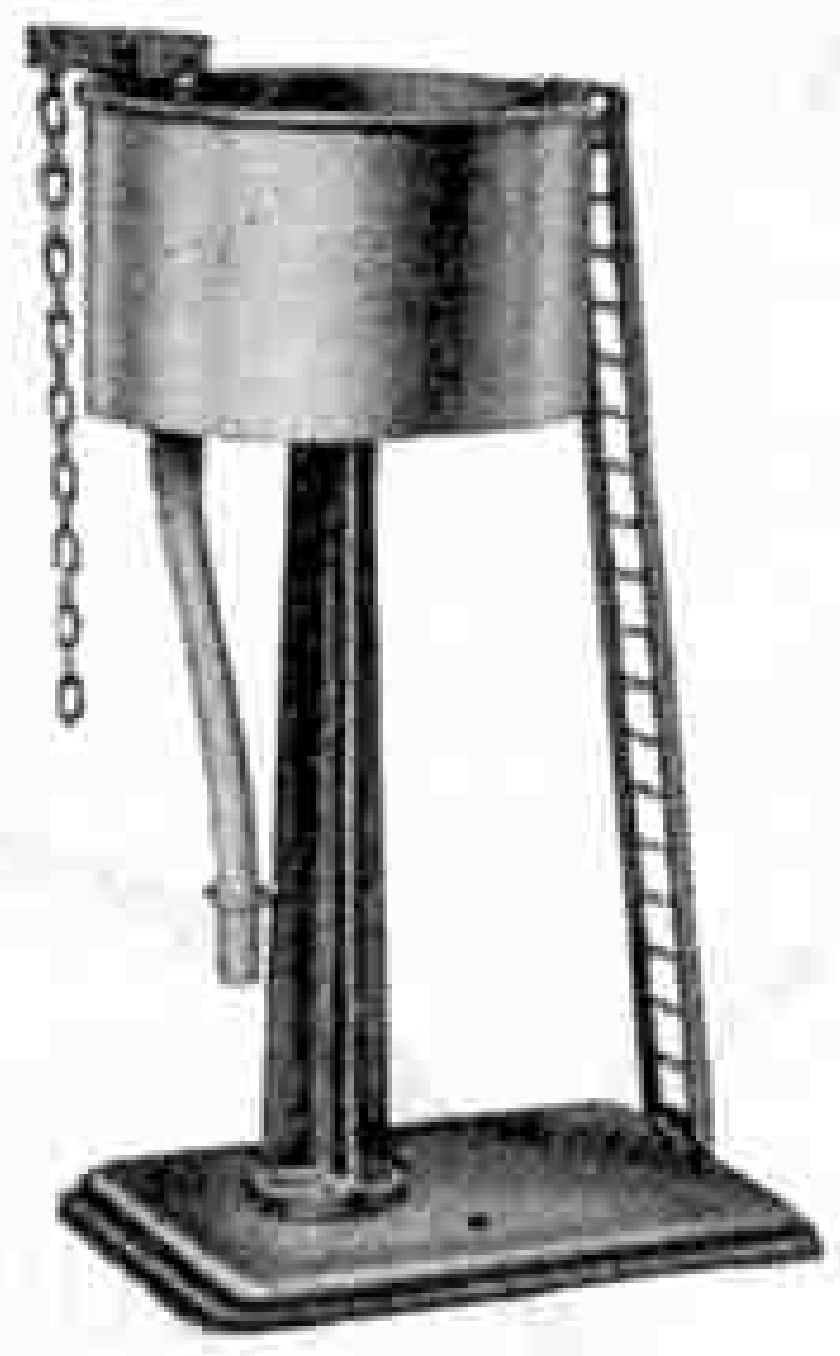
No. I ROTARY TIPPING WAGON
Finished in blue and pale gold ... ... Price 2/6

**In L.M.S.R., L.N.E.R., G.W.R., or S.R. lettering.*

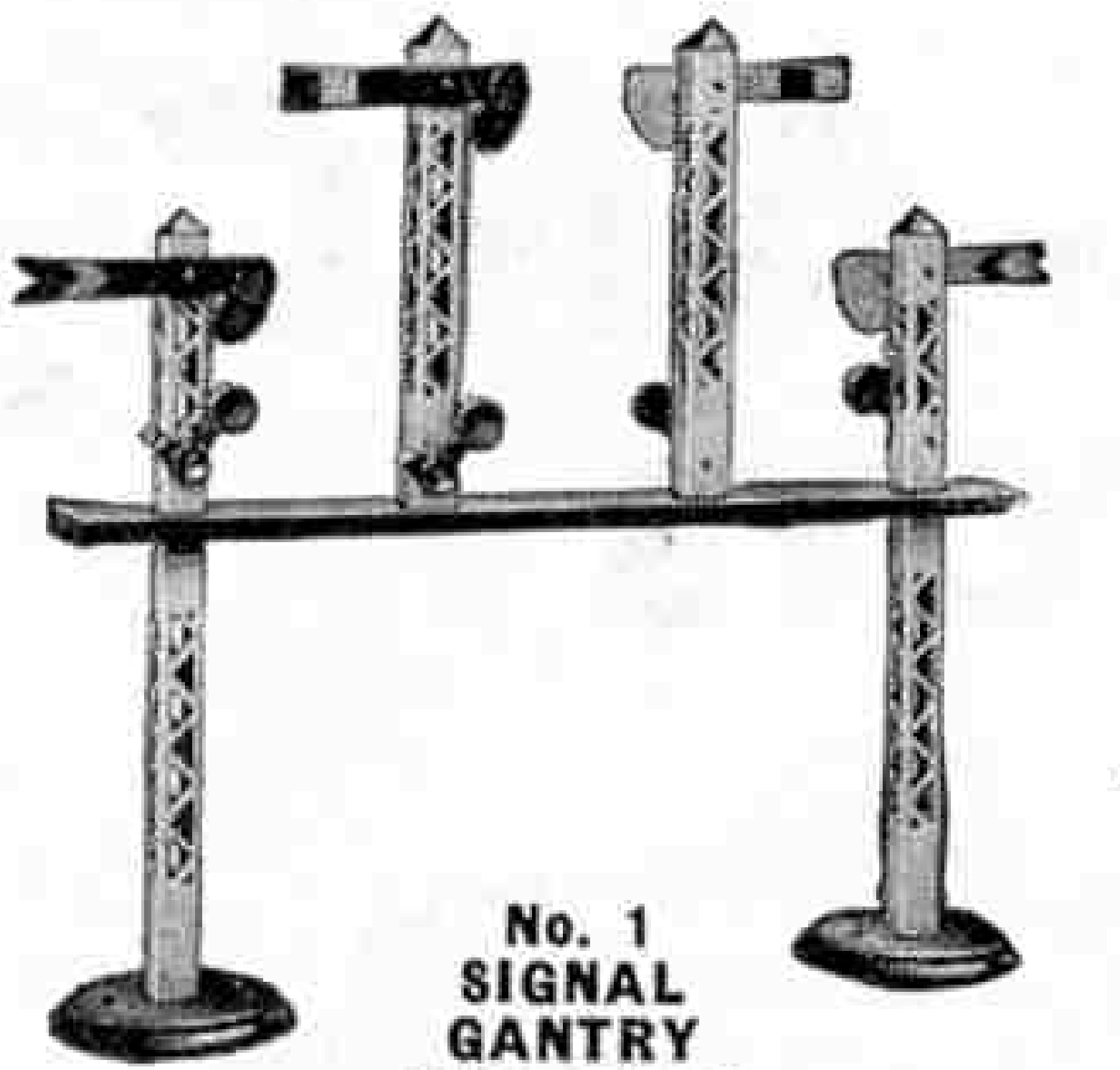
MECCANO LTD. - BINNS ROAD - LIVERPOOL 13

HORNBY SERIES HORNBY ACCESSORIES GAUGE O

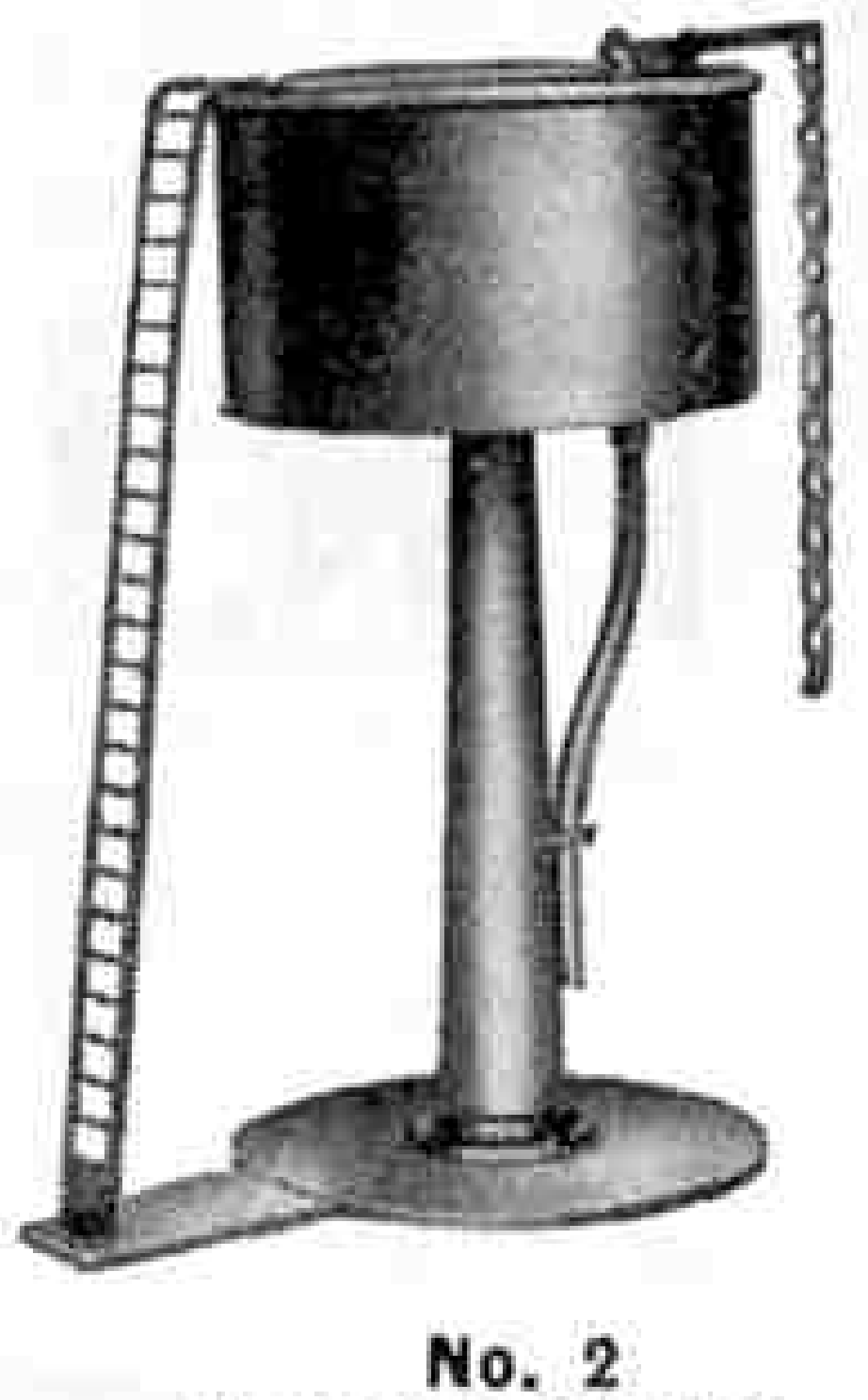
No. O TUNNEL (Straight)
Length 6 in., width 6½ in.
Price **1/3**
No. 1 TUNNEL (Straight)
Length 7$\frac{11}{16}$ in. Width 6½ in. (as illustrated). Price **1/9**
No. 2 TUNNEL (Straight)
Length 15⅝ in. Width 9½ in.
Price **3/6**



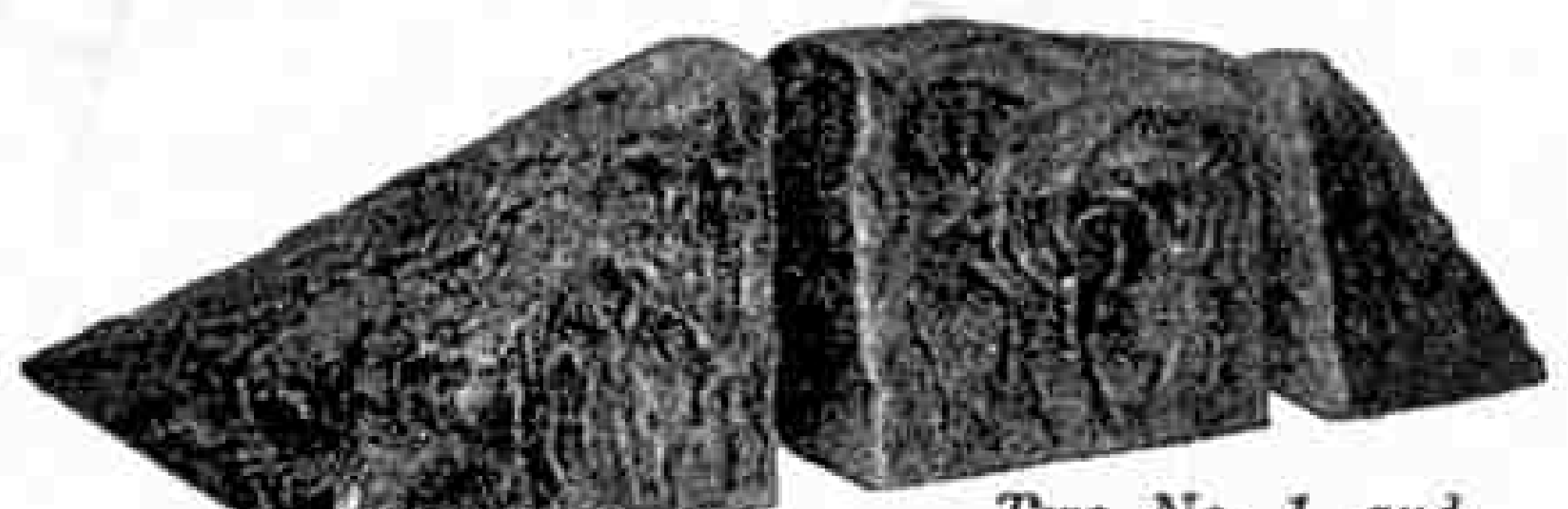
No. 1 WATER TANK
Fitted with flexible tube and valve lever. Stands 6½ in. high.
Price **3/-**



No. 1 SIGNAL GANTRY
Price **4/11**



No. 2 WATER TANK
Fitted with flexible tube and valve lever. Stands 8¼ in. high.
Price **5/9**



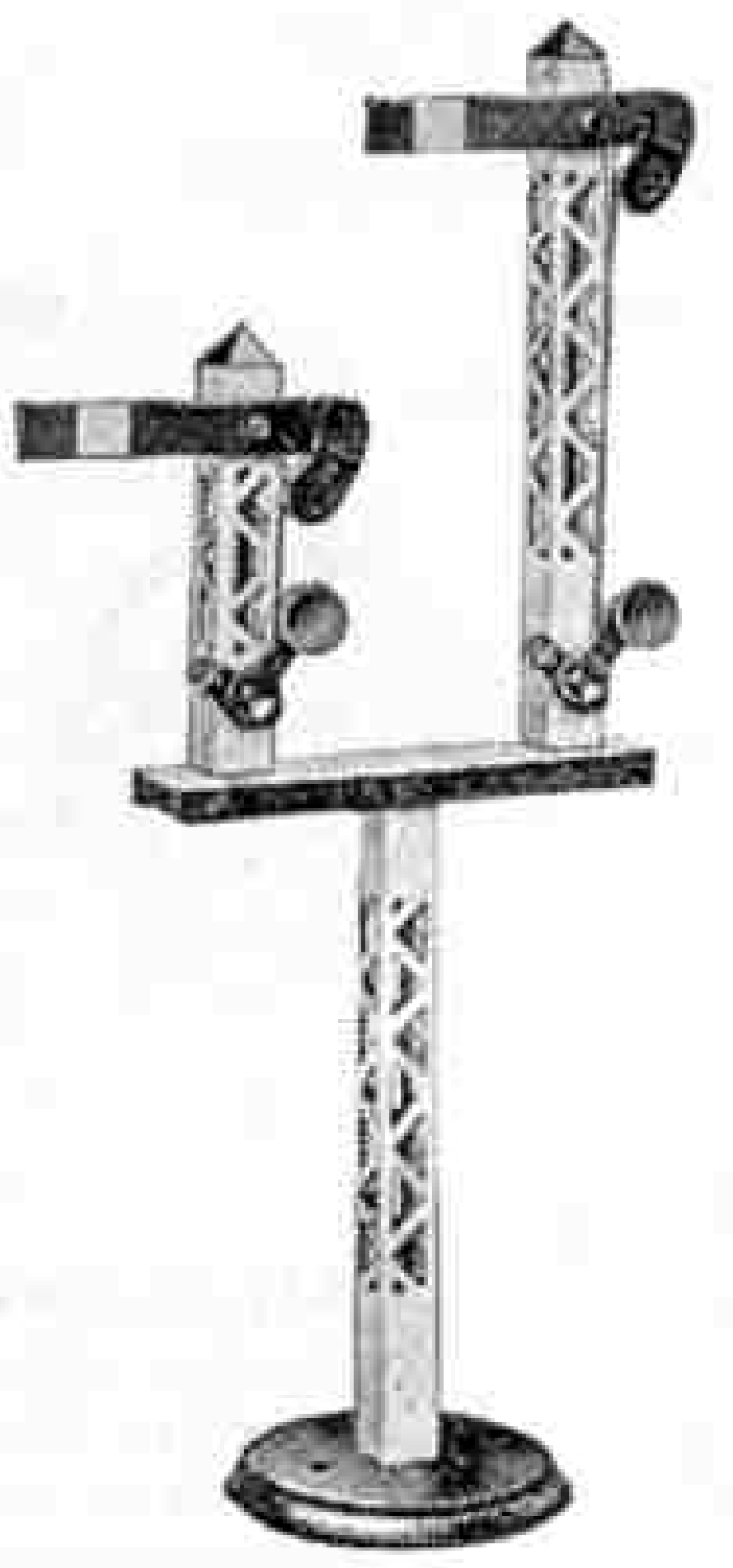
Two No. 1 and one No. 2 Cuttings are illustrated here.

No. 1 CUTTING (END SECTION)
Base measurement: Length 7$\frac{11}{16}$ in., width 6 in.
Price, per pair, **3/-**

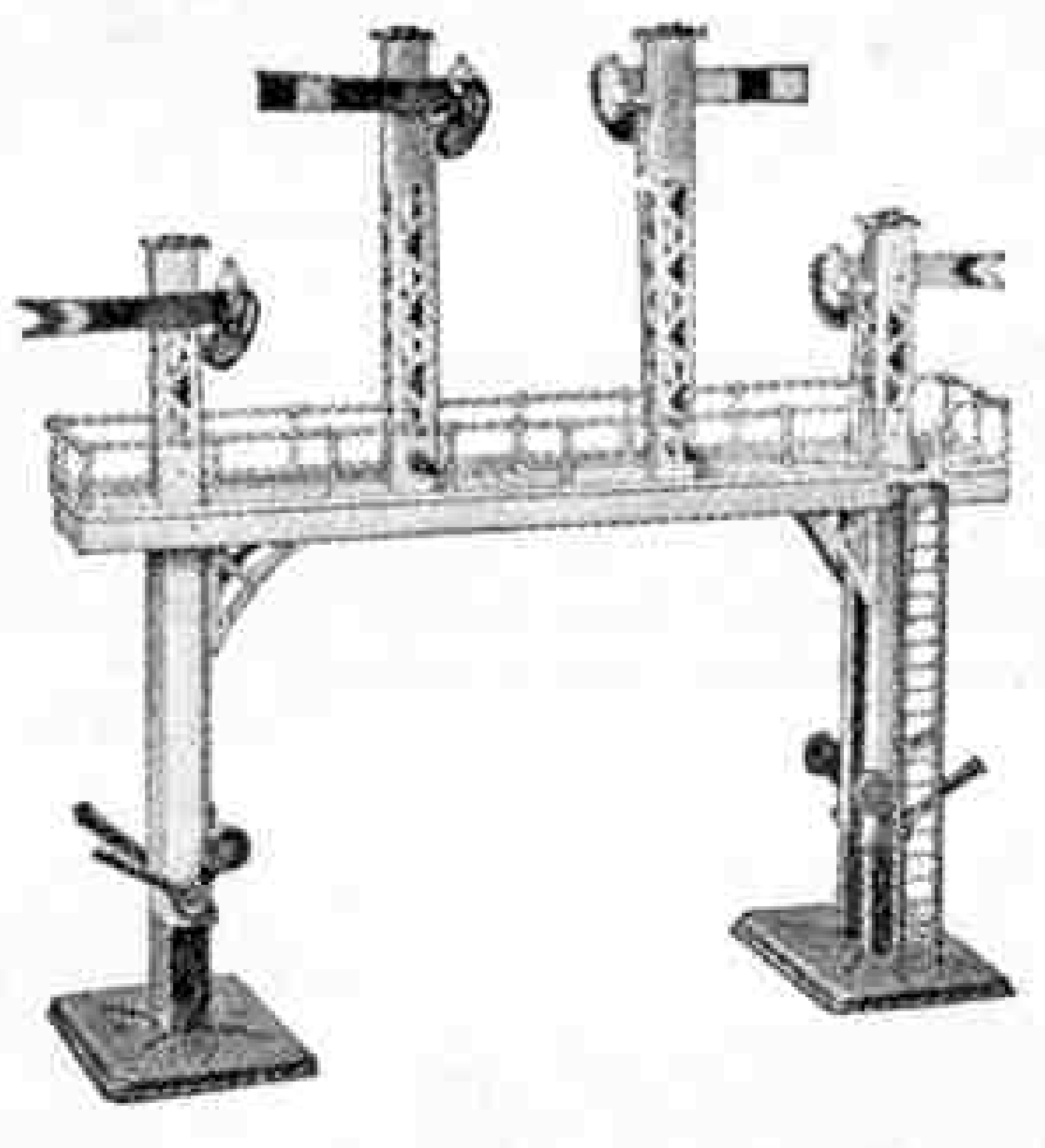
No. 2 CUTTING (CENTRE SECTION, STRAIGHT)
The addition of these Centre Sections enables a Hornby Railway cutting to be extended to any length. They are intended to be used in conjunction with the End Sections (Cutting No. 1), between which they are fitted.
Base measurement: Length 10¼ in., width 6 in.
Price **2/-**

No. 3 CUTTING (CENTRE SECTION, CURVED)
This is used for curved tracks in the same manner as the straight Centre Section, described above, is used for straight tracks. It is suitable for both 1 ft. and 2 ft. radius tracks. Price **2/-**

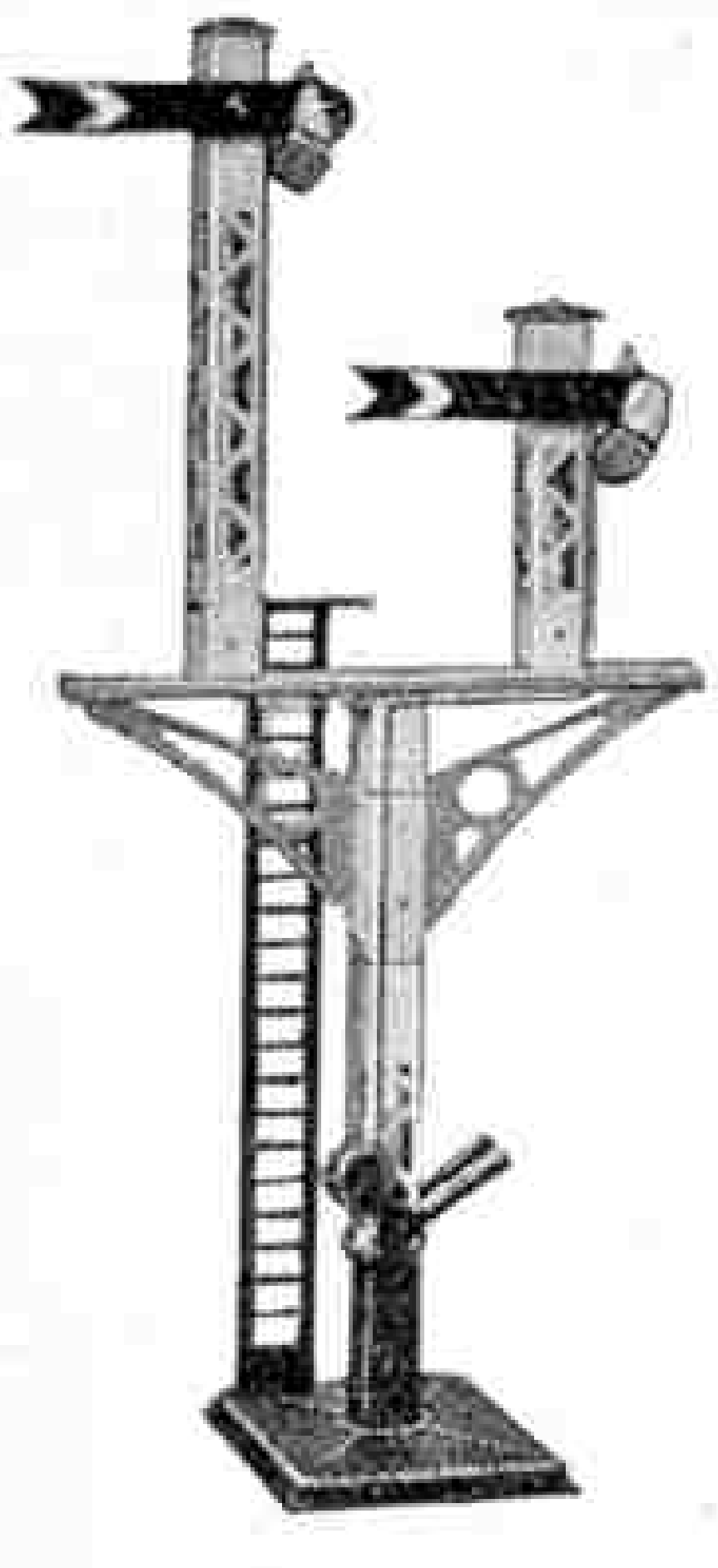
No. 5 TUNNEL (LEFT-HAND, CURVED)
(as illustrated)
This tunnel is in the form of a small hill, through which the track runs obliquely. For 2 ft. radius tracks. Base measurement: 15⅞ in. × 14¾ in. Length of track, 17½ in. Price **6/9**
No. 6 TUNNEL (RIGHT-HAND, CURVED)
Similar to No. 5 Tunnel, but with track in the reverse position. For 2 ft. radius tracks only. Base measurement 15⅞ × 14¾ in. Length of track 17½ in. Price **6/9**



No. 1 JUNCTION SIGNAL
Price **2/9**



No. 2 SIGNAL GANTRY
Price **10/-**

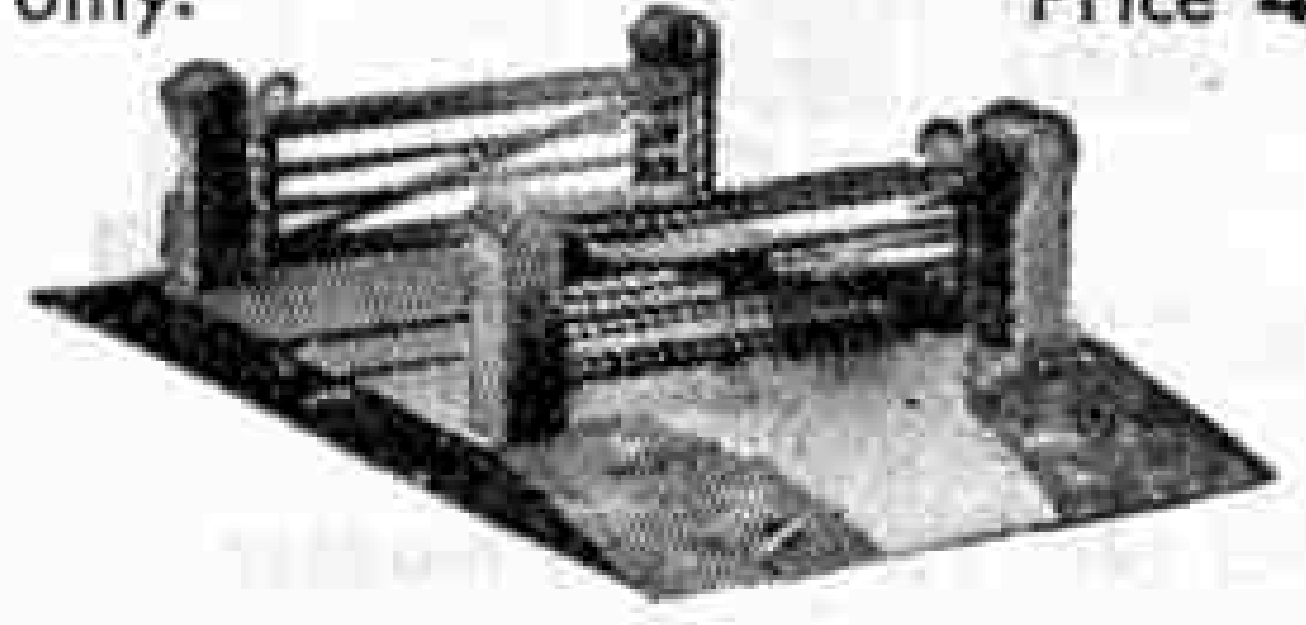


No. 2 JUNCTION SIGNAL
Price **4/9**

No. 4 CUTTING (STRAIGHT)
This is a double cutting, mounted on a base over which the railway track is laid. Base measurement: Length 15⅝ in., width 15 in. Price **6/-**

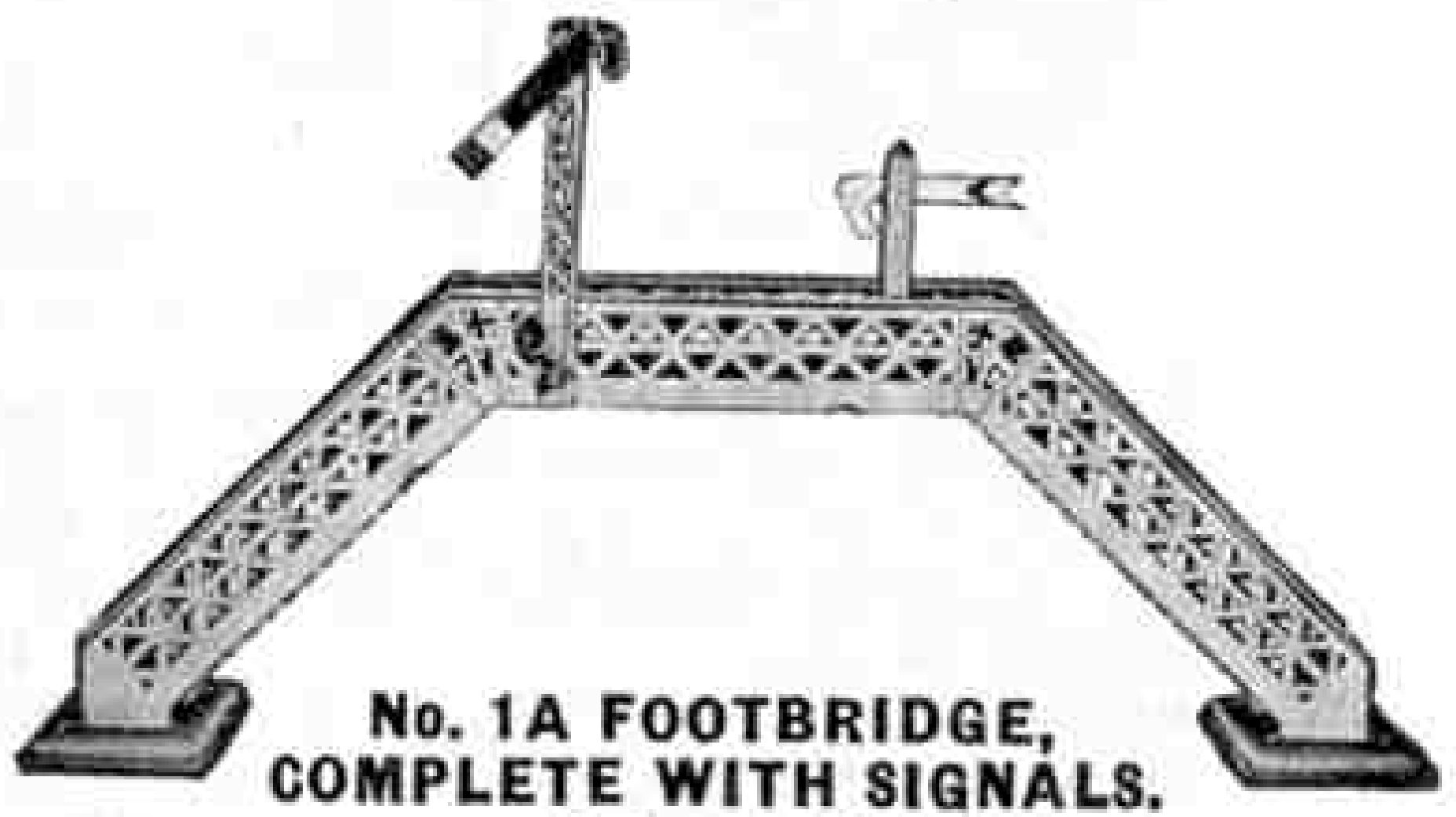
PRODUCT of MECCANO LIMITED LIVERPOOL

No. 3 TUNNEL (Curved)
Length 13 in. Price **4/-**
No. 4 TUNNEL (Curved)
(as illustrated)
Length 20 in. For 2 ft. radius tracks only. Price **4/9**



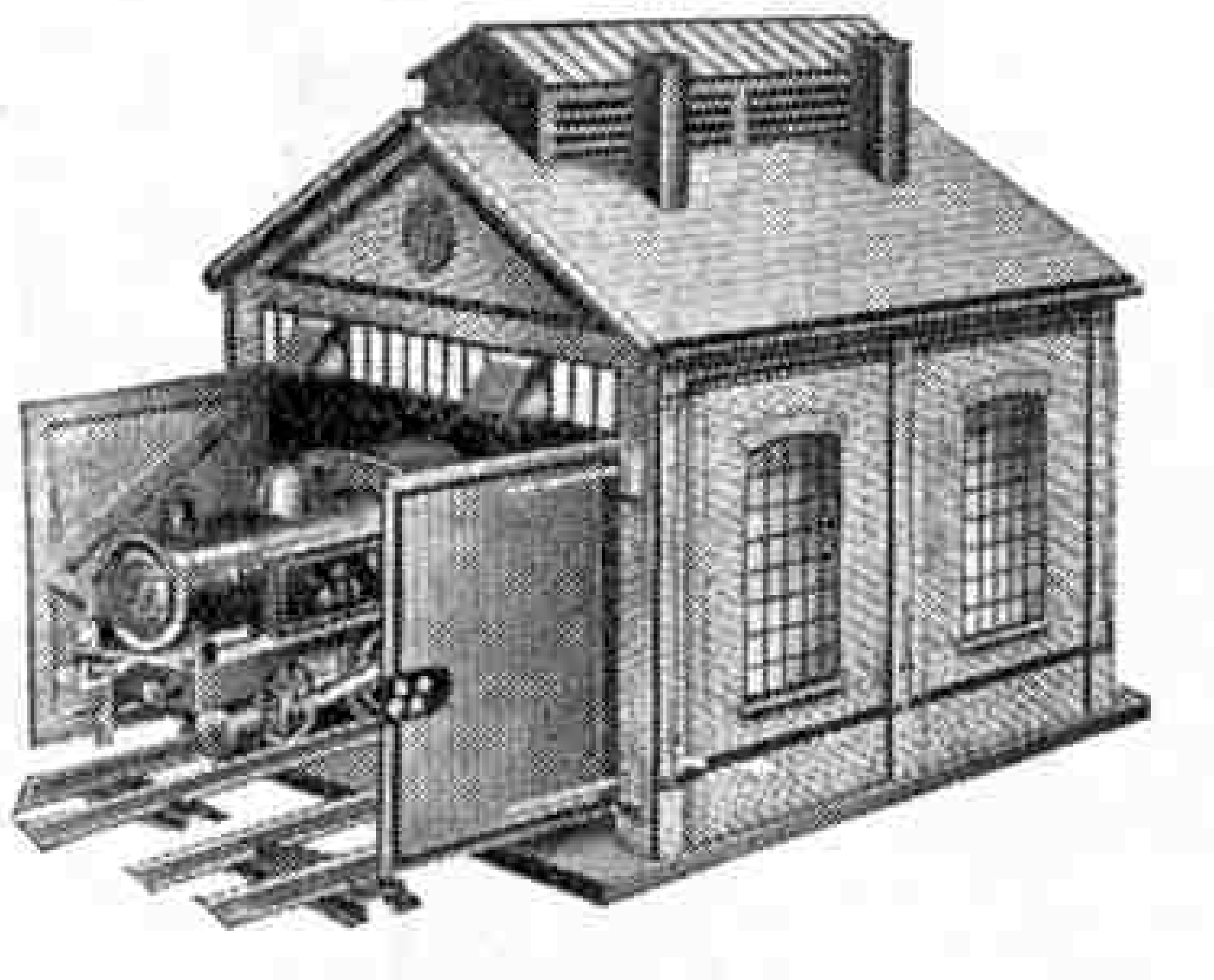
No. 1 LEVEL CROSSING
Suitable for a single track only and has Gauge O rails in position.
Price **2/11**

No. 1 SIGNAL CABIN
Price **2/6**
No. 2 SIGNAL CABIN
(illustrated)
Dimensions: Height 6½ in., width 3½ in., length 6½ in. Roof and back open to allow Lever Frame to be fitted inside cabin if desired.
Price **3/9**

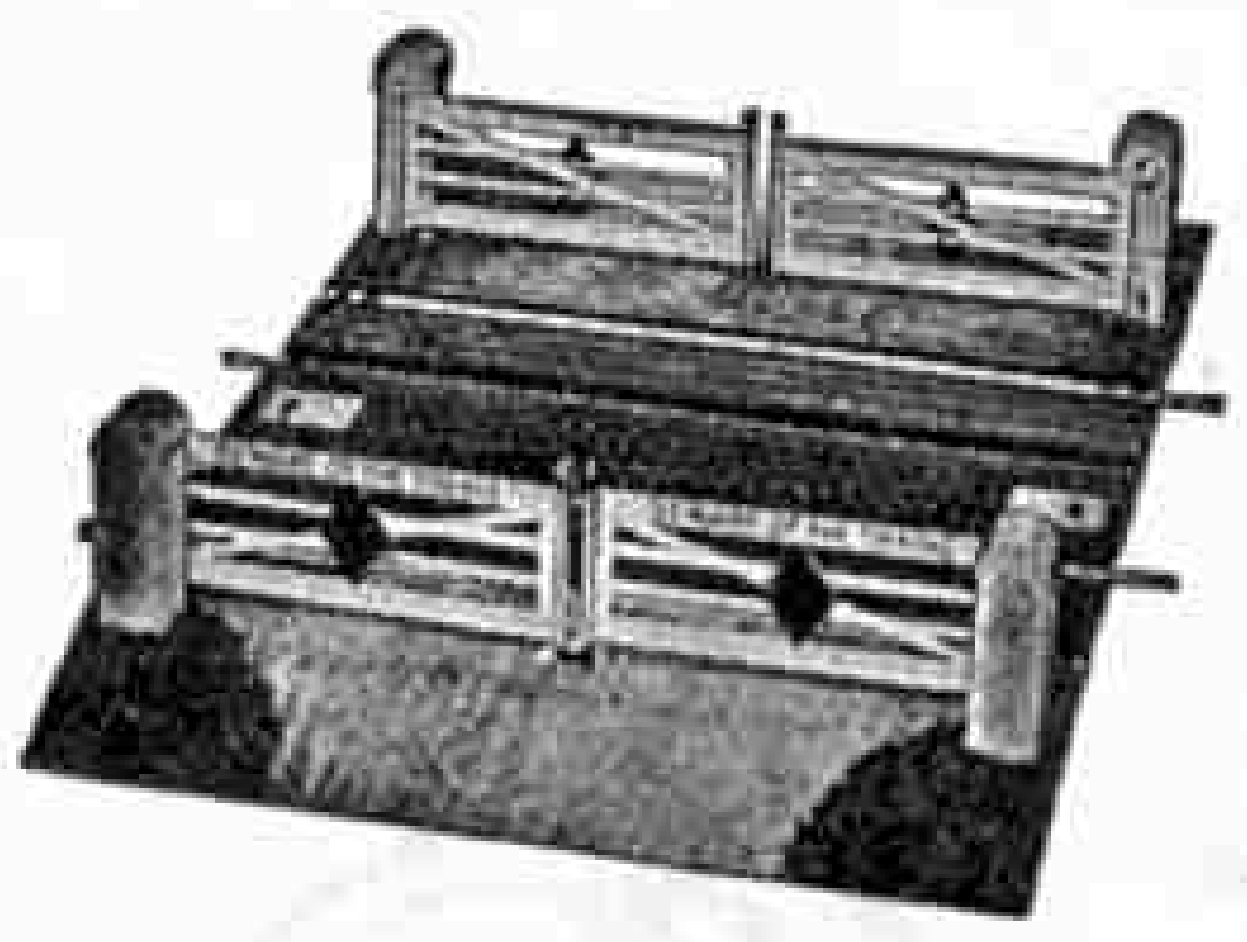


No. 1A FOOTBRIDGE, COMPLETE WITH SIGNALS.
Price **4/6**
No. 1 FOOTBRIDGE WITHOUT SIGNALS Price **2/11**

SHUNTER'S POLE
Price **2d.** each

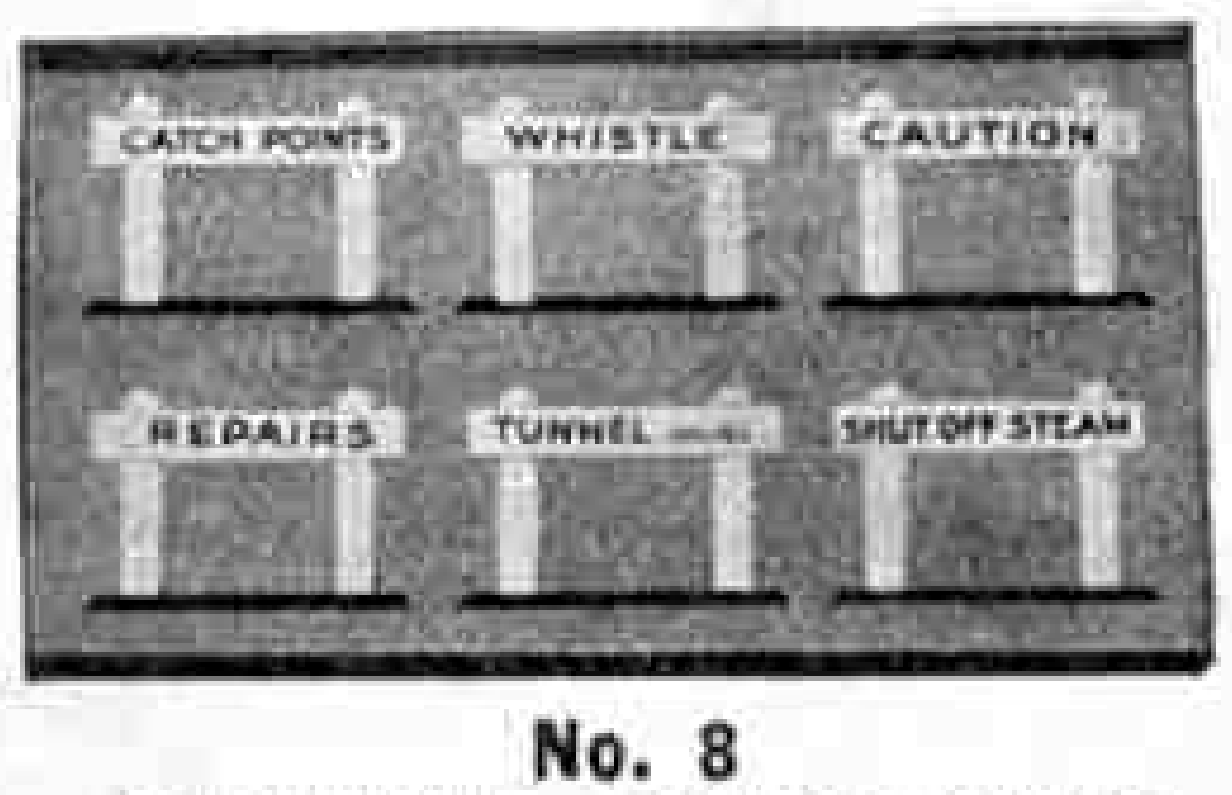


No. 1 ENGINE SHED (illustrated)
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. ... Price **15/-**
No. 2 ENGINE SHED
This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 17½ in. ... Price **22/6**

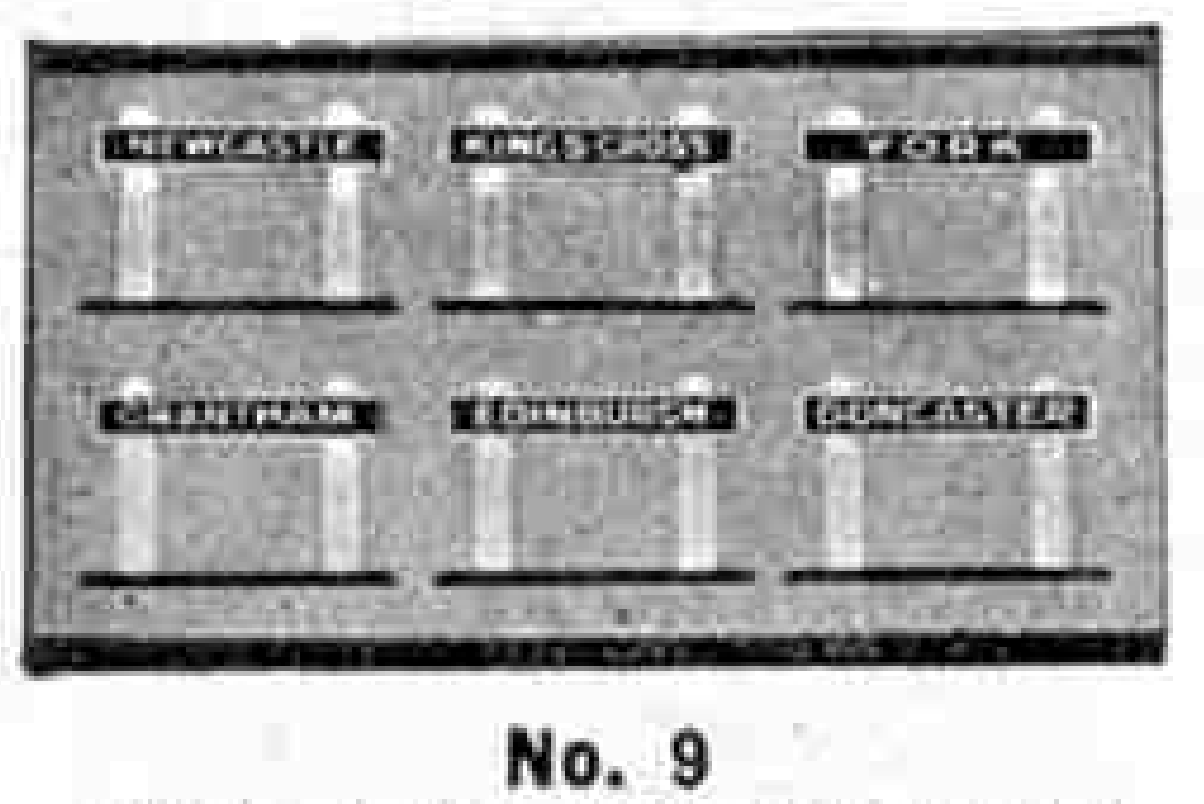


No. 2 LEVEL CROSSING
Measures 13½×10¼ in., with two tracks of gauge O rails in position. Price **5/6**
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks. Price **7/6**

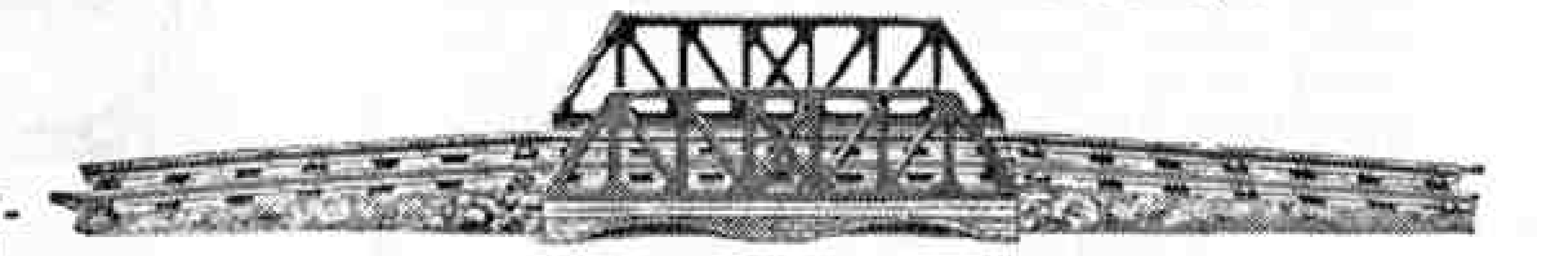
M TELEGRAPH POLE No. 2
Price
4d. each



No. 8 RAILWAY ACCESSORIES
Notice Boards ... Price **1/9**

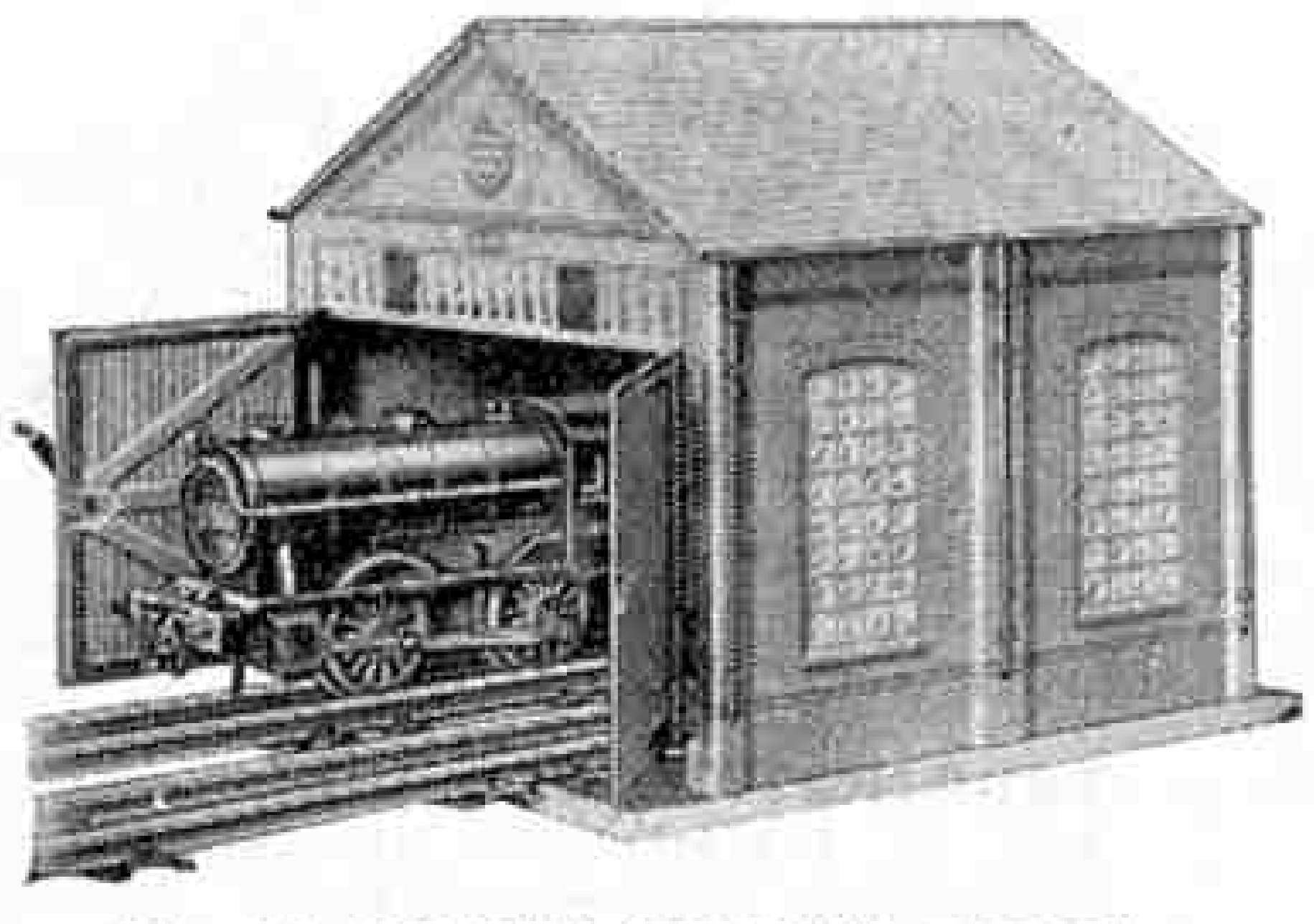


No. 9 RAILWAY ACCESSORIES
Station Name Boards.
Price **1/9**



VIADUCT. Price **6/6** **VIADUCT ELECTRICAL.** Price **7/6**
VIADUCT. Centre Section only. Price **4/-**
VIADUCT (electrical). Centre Section only ... Price **4/6**

TELEGRAPH POLE
Price, per pair, **3/6**



No. 1A ENGINE SHED (illustrated)
This Shed is of the same dimensions as the No. 1 Shed described above, but is of simpler design, and has doors at one end only ... ... Price **10/6**
No. 2A ENGINE SHED
This Shed is of the same dimensions as the No. 2 Shed described above, but is of simpler design ... ... Price **17/6**

Ask your dealer for a complete illustrated price list of Hornby Trains, Rolling Stock and Accessories.

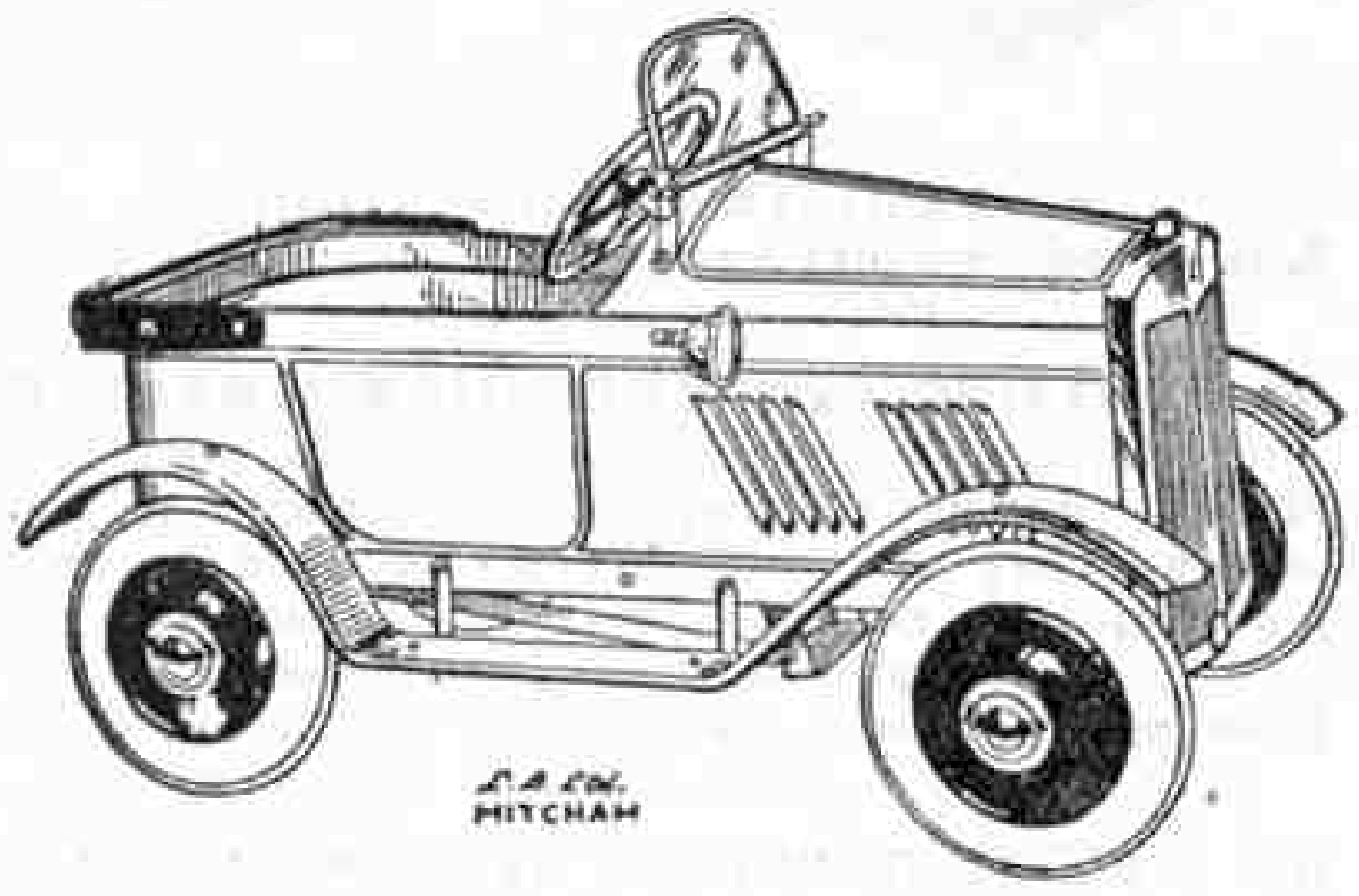
MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

Regd. Trade Mark

Regd. Trade Mark

HAPPY HOURS WITH TRI-ANG TOYS

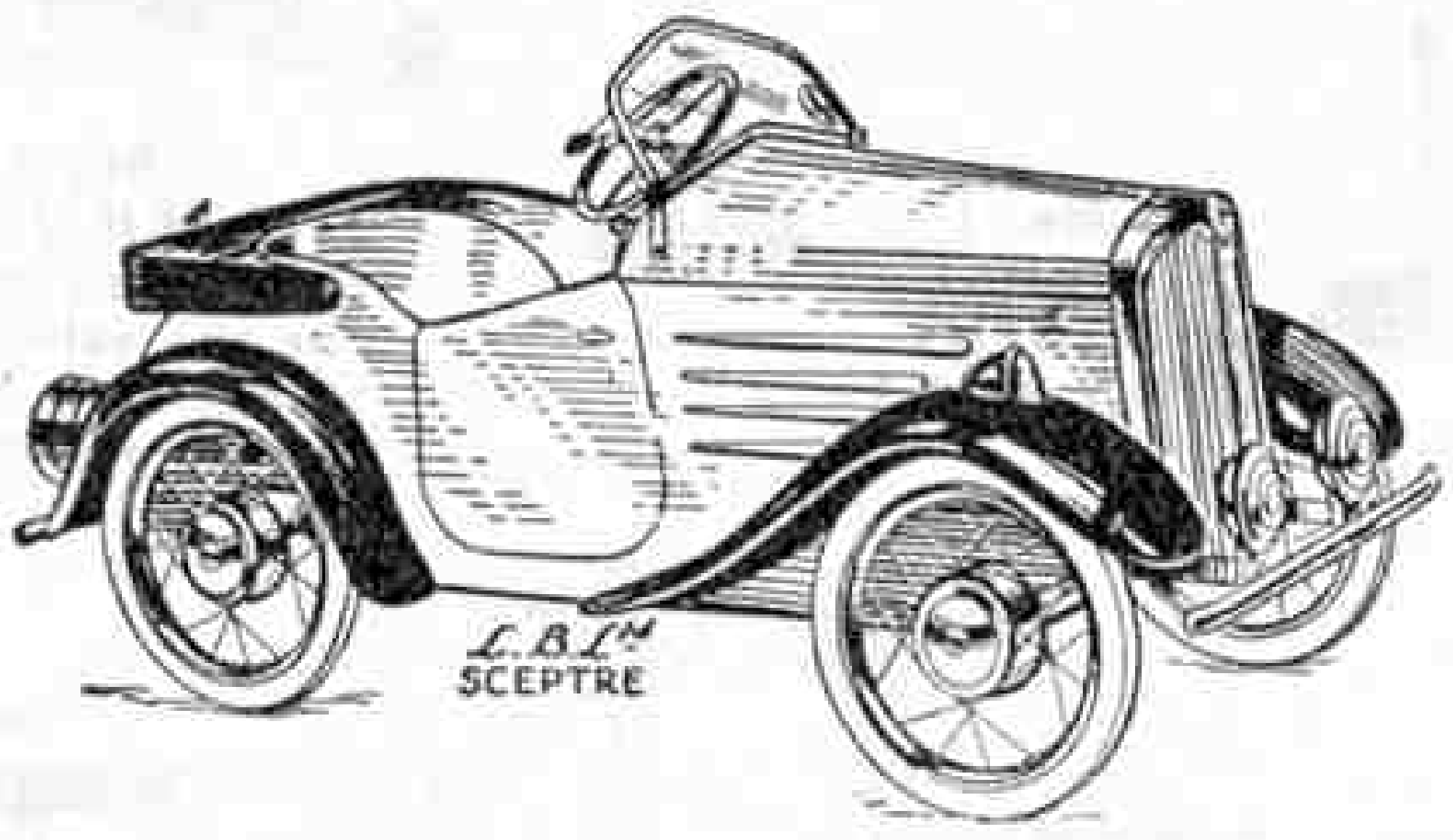
ASK YOUR DEALER **NOW** for the 1935-36 Tri-ang Coloured Toy Leaflet.



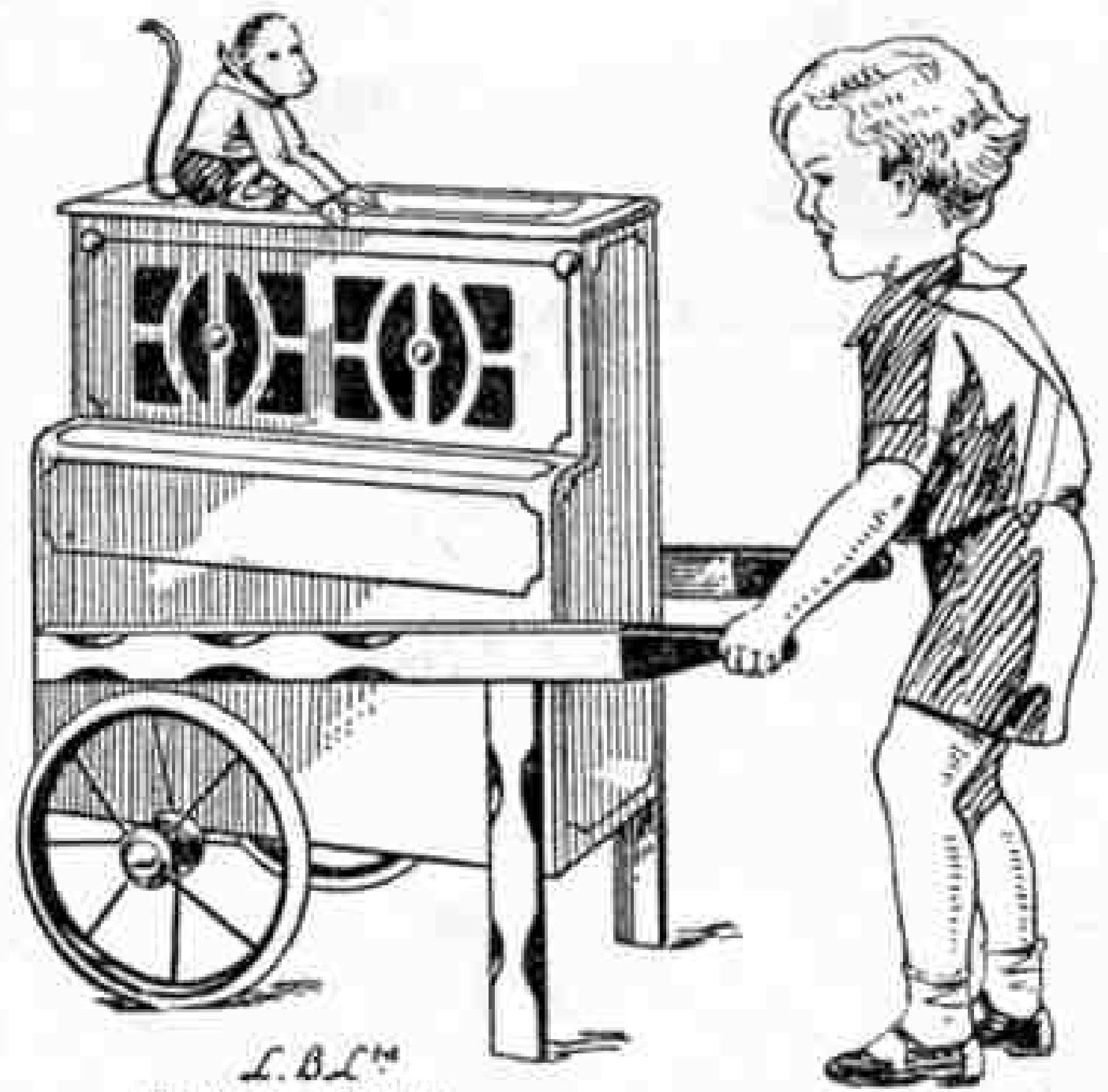
MITCHAM. Now greatly improved with balloon disc wheels and sloping radiator. Pressed steel body, opening side door, dummy hood and lamps. Tubular windscreen. Length 32 ins. Price **21/-.**

TRI-ANG STORES "B." Open your own shop. This delightful new toy is fitted with seven drawers and name tabs, and is complete with scales, dummy boxes and bottles. Height 24 ins. Price **15/-.**

TRI-ANG TRICYCLE (Regd. Trade Mark) **No. 5. Fitted with mudguards.** Cycle chain drive, free wheel. Frame best quality weldless steel cycle tubing. 14 in. wheels. 1⅛ in. jointless sponge rubber tyres. Rim brake. Coil spring saddle. CHROMIUM FITTINGS. Black or blue. Price **59/6.**

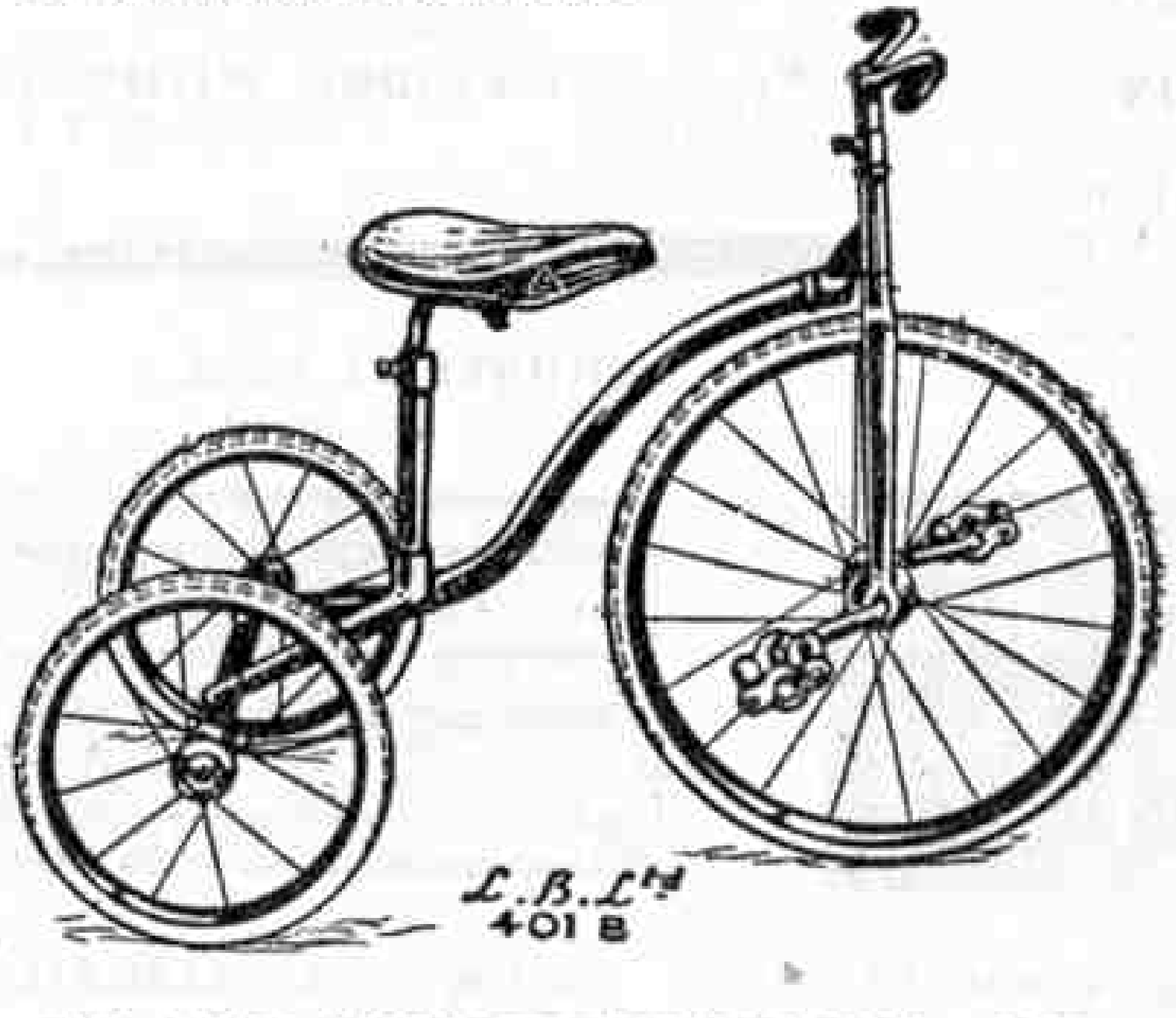


SCEPTRE. Up-to-date sports design. Steel body on tubular chassis. Chain and crank drive. Tangent spoke wheels. Jointless sponge rubber tyres. Chromium-plated hubs and rims. Two electric side lamps. Electric Stop and Go, and buzzer horn. Length 45 ins. Price **84/-.**



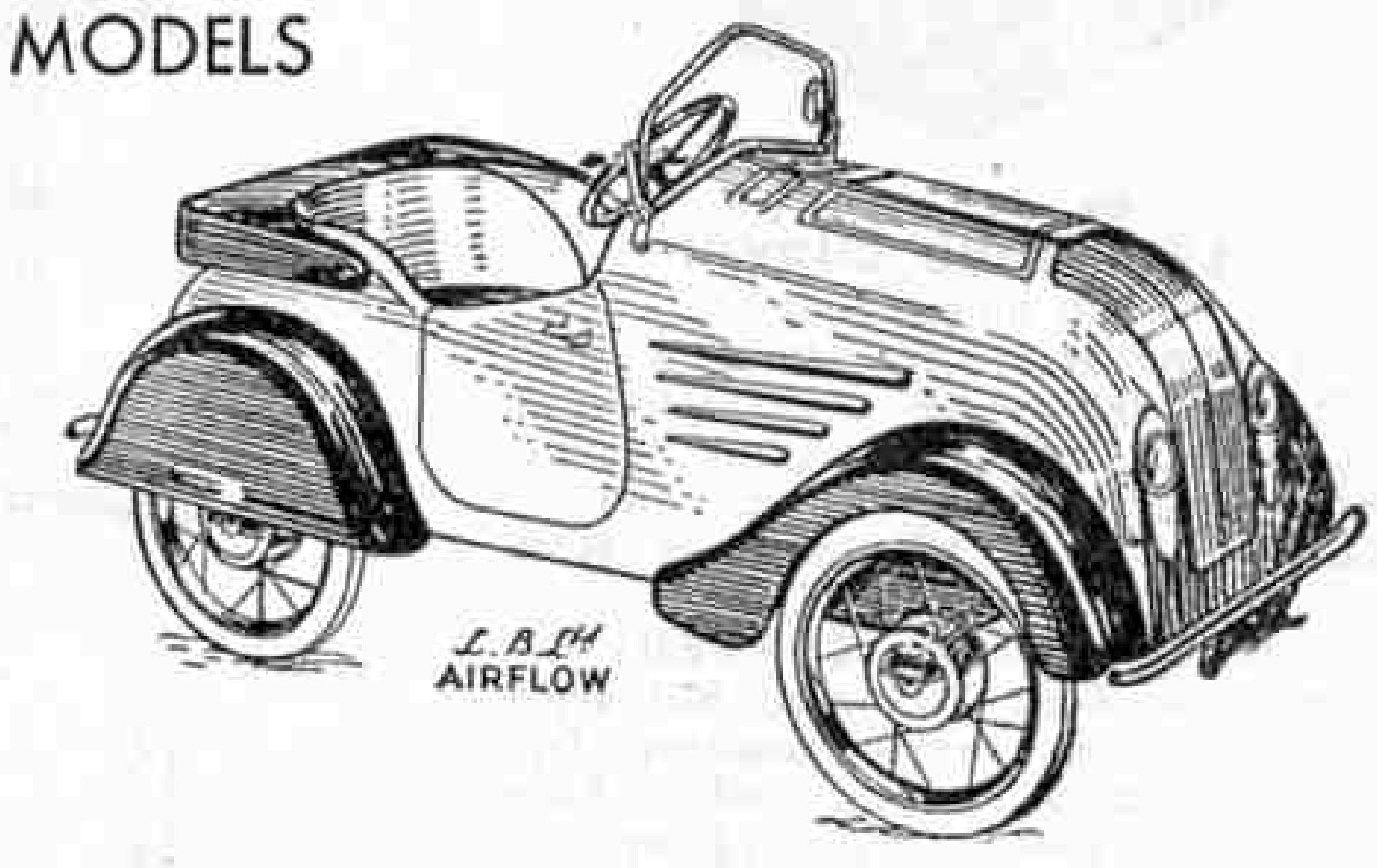
"Boy out of Scale"

BARREL ORGAN "A." Here is an amusing and novel toy fitted with musical box and handle at rear of organ, also locker between the handles. Beautifully finished in blue. Height 14 ins. Price **12/6.** **Note.** The monkey is not included, but can be obtained at extra cost.

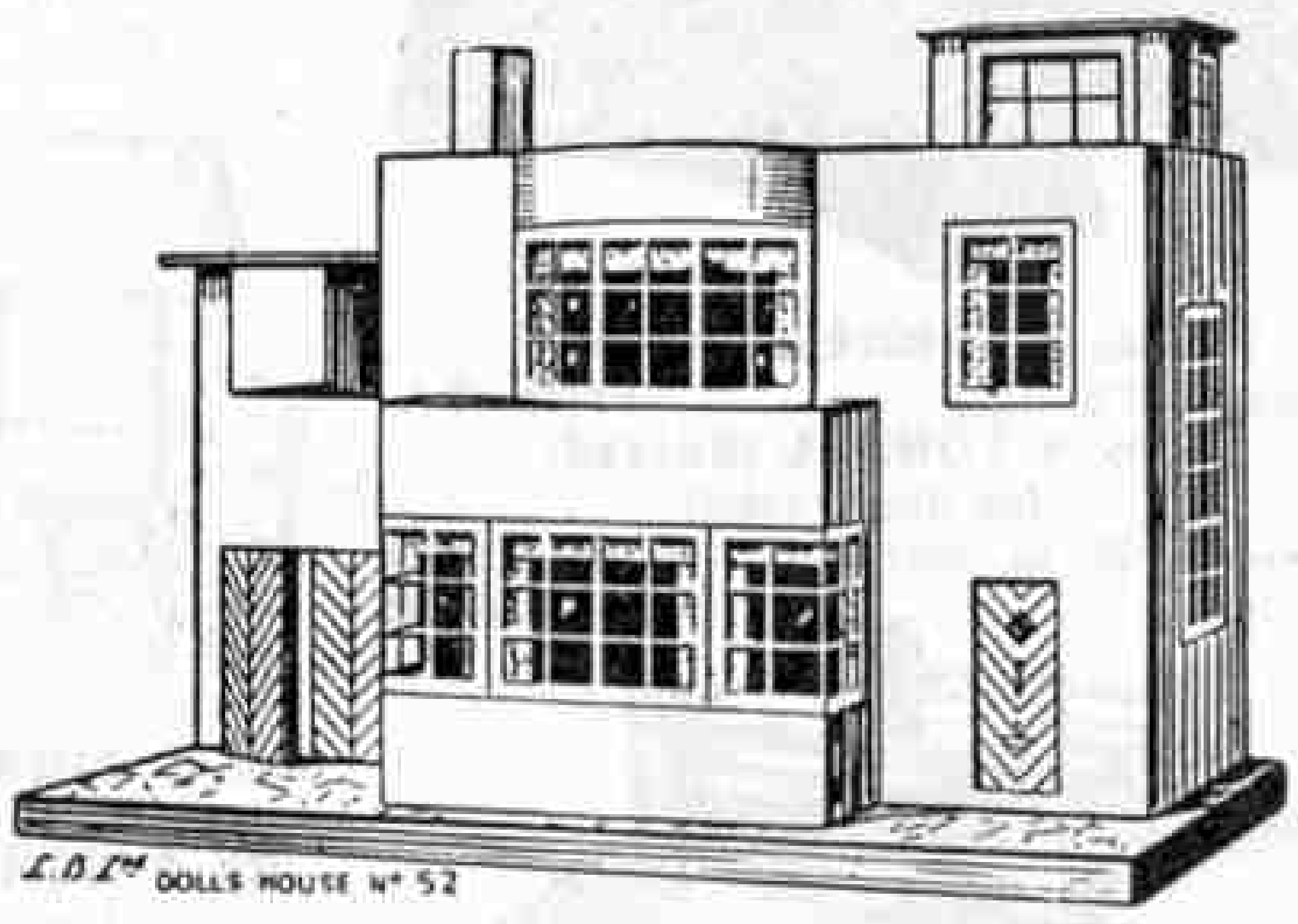


TRI-ANG JUNIOR TRICYCLE No. 401B. Cycle tube frame, enamelled black. Adjustable saddle. Tangent spoke wheels. Auto-tread tyres. Nickel-plated fittings. Rubber pedals and handle grips. Front wheel 15 ins., back wheels 9½ ins. Price **22/6.**

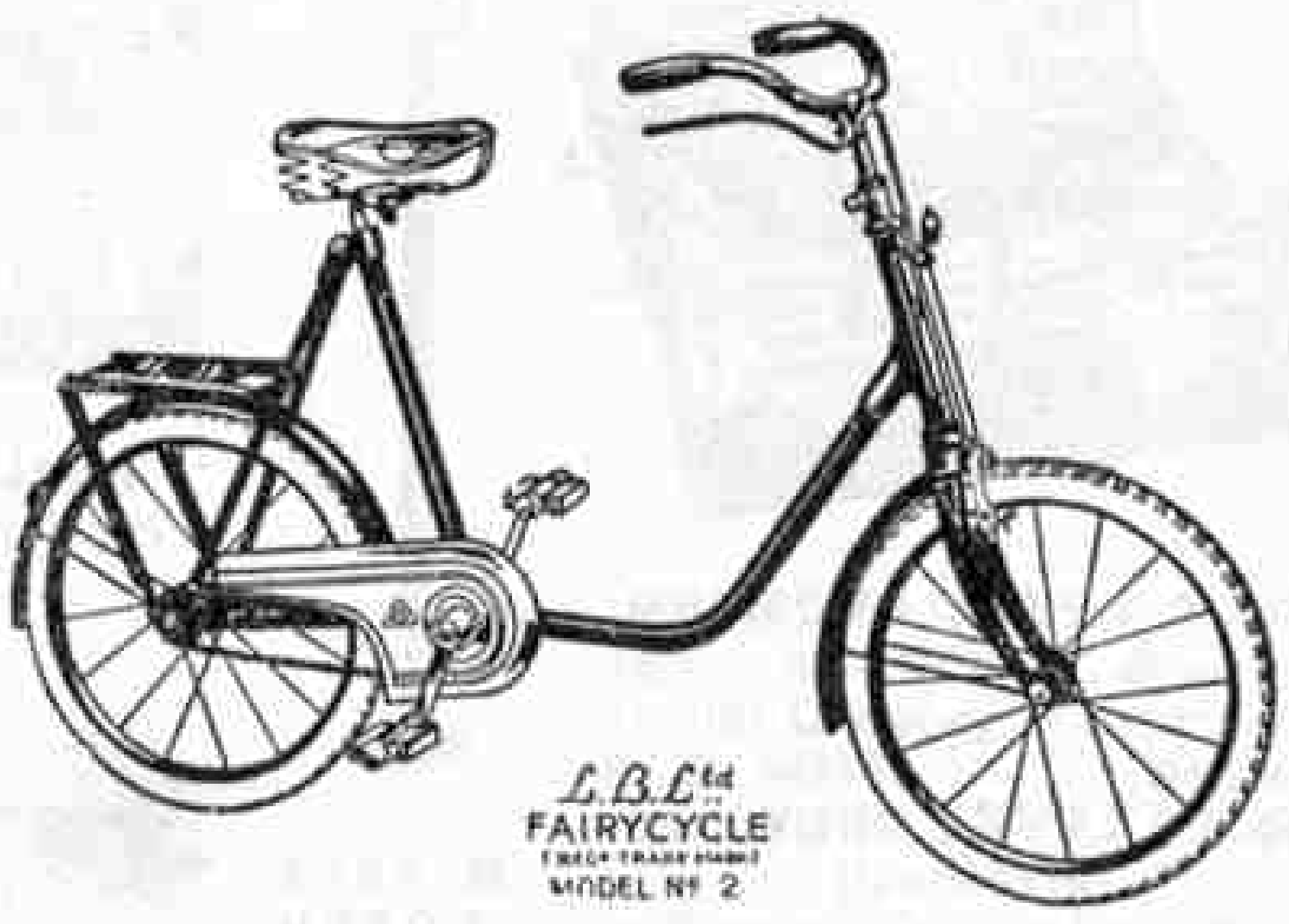
1936 MODELS



AIRFLOW. A really luxurious car. Tubular chassis. Chain and crank drive. Tangent spoke wheels. Chromium-plated hubs and rims. Jointless sponge rubber tyres. Facsimile airflow radiator. Two sunken electric headlamps. Length 45 ins. Price **90/-.**



DOLL'S HOUSE No. 52. A really modern design with movable suntrap. Two large rooms fitted with electric wall lights. Metal framed windows. Built-in garage with opening doors. Beautifully finished in cream and green, with imitation crazy paving. Length 33 ins. Price **35/-.**



FAIRYCYCLE (Regd.) **No. 2.** Tubular frame. 14 in. wheels. 1⅛ in. Auto-tread tyres. Ball-bearing pedals. Rim brake. Two-coil saddle. Chain cover and stand. Black or blue. CHROMIUM-PLATED FITTINGS. Price **39/6.**

LINES BROS. LTD.

TRI-ANG WORKS - LONDON, S.W.19

NEXT MONTH: "THROUGH THE ALPS ON THE FOOTPLATE." PUBLISHING DATE: 30th NOVEMBER.

MECCANO MAGAZINE

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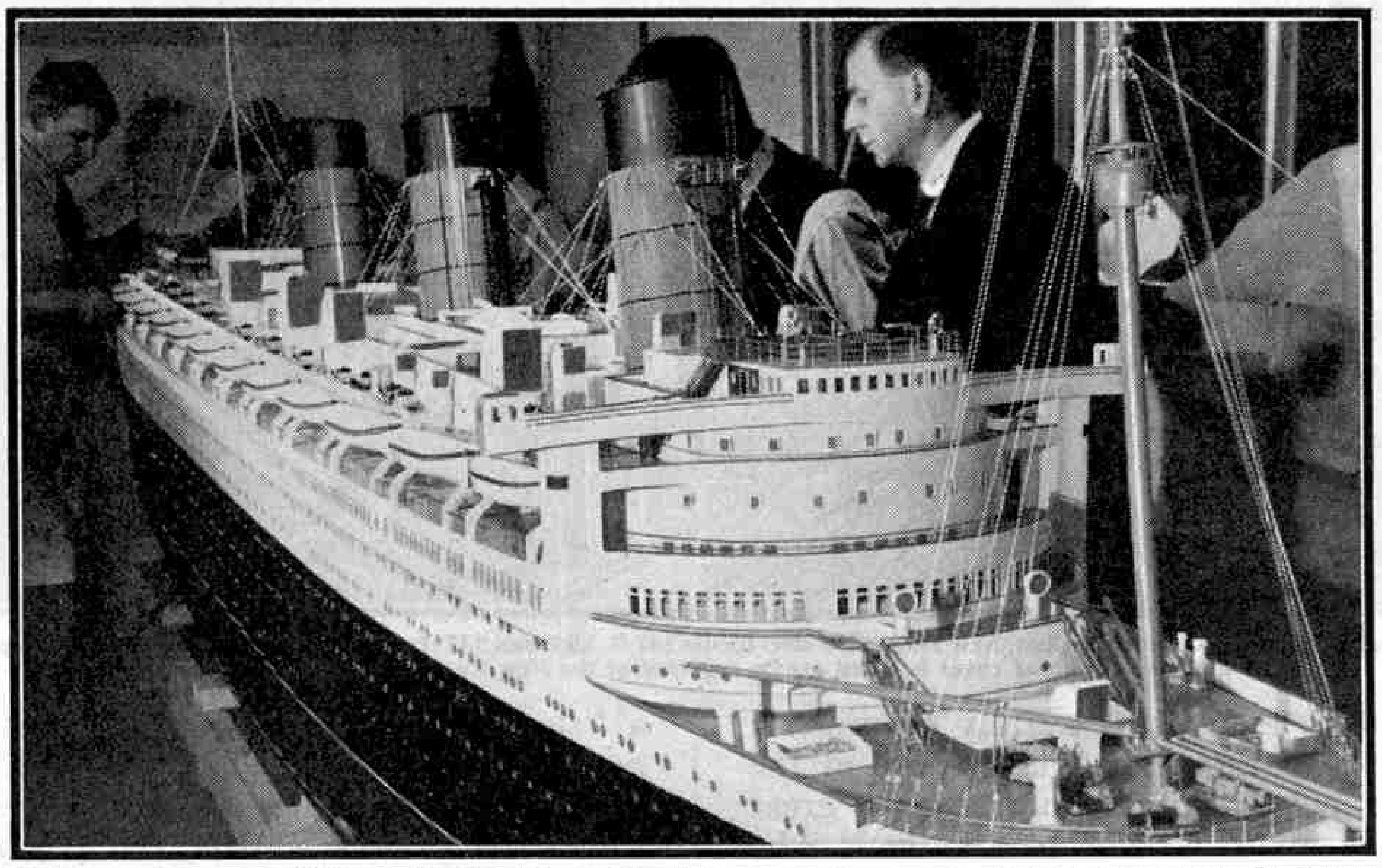
November, 1935

With the Editor

A Noise Limit for Motor Cars

It is unfortunate that so many of the wonderful developments of science and engineering have resulted in an increase in the amount of noise in the world. A good deal of this noise appears to be inevitable, but much of it could have been avoided if the problem had been tackled seriously from the start. The noise of motor road vehicles, for instance, has been allowed to grow almost unchecked. It is of course an offence for vehicles to make an "excessive" noise, and the police have power to deal with such cases; but so far there has been no means of determining what really is an excessive noise. As a result, outrageous offenders have been penalised, but a general level of noise of far too great intensity has been allowed to continue unchecked. We may look for an improvement in the near future, however, if the Minister of Transport's recent proposals are carried into effect. Under his scheme it will be an offence after a certain date for motor cars to make more than a definite amount of noise; and the allowance of noise is to be 90 phons when running at a speed of 30 miles per hour. The phon, we are told, is the unit of noise measurement adopted, and the number of phons will be indicated by means of a specially designed noise meter.



Craftsmen at work on a 22 ft. model of the "Queen Mary," the great liner approaching completion in the Clydebank shipyard of John Brown and Co. Ltd. Photograph by courtesy of Bassett-Lowke Ltd., Northampton.

"Phons"

This is interesting, but at once we want to know what kind of a noise is represented by 90 phons. It is said to be approximately equal to the amount of noise heard in a "Tube" train with the windows open, and if so it seems a generous allowance. Another comparison is that with a busy typing room in full swing. Some of the statements concerning the measurement in phons of other noises are rather surprising, and appear to show that our ideas of relative amounts of noise are faulty. For instance, it is said that the ticking of a watch at a distance of 3 ft. from the meter registers about 30 phons, while the noise of tearing paper at a similar distance registers 40 phons. Ordinary polite communication, that is to say with no heated arguments going on, registers about 60; an aeroplane engine fairly close at hand is equivalent to 110 to 120, or slightly more than is registered by the universally hated pneumatic drill.

If the Minister of Transport succeeds in his efforts in this direction it is expected that he will pass on to control motor horns, many of which are very harsh and disagreeable and certainly louder than is necessary. As a final step he might turn his attention to securing silent motor car doors. At present most doors seem to need more or less violent slamming, which is a definite source of annoyance.

It is interesting to note that the Department of Scientific and Industrial Research are making strenuous efforts to solve the problem of the sound-proof house. During recent years the necessity of reducing the cost of building has led to an appreciable reduction in the thickness of walls and floors, with the result that houses have become less and less sound proof. It is not possible to return to the old massive methods of building, and some other means of securing reasonable silence must be found, especially for flats. One of the most difficult noise problems is provided by the gramophone. Electrical methods of recording and reproduction have brought about a great increase in the volume of sound, and in many recently-built small houses it seems impossible to enjoy an evening's gramophone music without annoying the next-door neighbour.

"The Silver Jubilee"

One of the most interesting events in British railway history has been the introduction by the L.N.E.R. of *"The Silver Jubilee"* Express, giving a four-hour service in each direction between London and Newcastle. By this train a business man can leave Newcastle at 10 a.m., arrive in London at 2 p.m., leave London again at 5.30 p.m., and reach Newcastle at 9.30 p.m. He thus has 3½ hours available for business in London, and none of this time need be wasted on meals, because a restaurant service is provided on the train in both directions. There is little doubt that this service will prove popular. Probably some of the journeys made so far have been inspired by the novelty of the train rather than by necessity, but there is a definite demand for higher main-line speeds between important business centres. Wartime necessities, and the preliminary difficulties brought about by grouping, were no doubt responsible to some extent for the almost stagnant conditions in regard to railway speeds, but no such excuses now exist. It will be interesting to see whether *"The Silver Jubilee"* marks the beginning of an all-round increase in speed, bearing some relation to the increase in locomotive power.

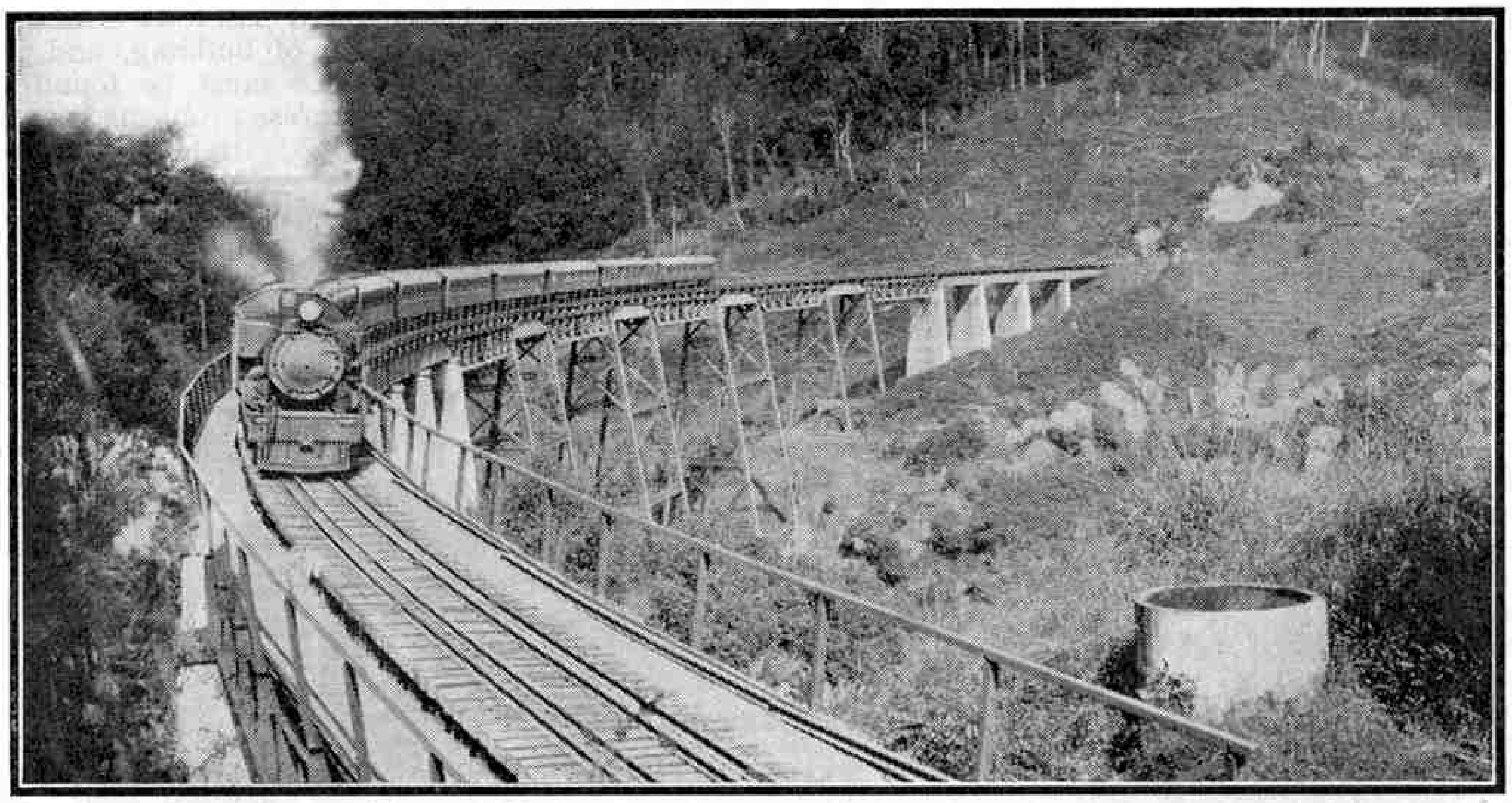
"The Silver Jubilee" had already broken several world records on its special trip prior to the commencement of its public service, when the maximum speed of 112½ m.p.h. was attained twice. Over a distance of 25 miles speed was maintained at or over 100 m.p.h. This is a world record as far as can be ascertained for steam or Diesel propulsion. Actually 70 miles were covered at an average of 91.8 m.p.h., which is a world record for steam traction.

Express Train Operation in New Zealand

A Run on *"The Night Limited"*

By "K"

IN comparing the train services in New Zealand with those operating in Great Britain, it is necessary to bear in mind the great difference in the conditions. Railway enthusiasts in the United Kingdom are naturally proud of such trains as *"The Royal Scot,"* *"The Flying Scotsman,"* the *"Cornish Riviera Limited,"* or *"The Golden Arrow,"* and the numerous other day and night fliers whose names are household words. These are trains with a great tradition, running over routes that have been in course of constant development for many years; and they are famous all over the world, representing the hallmark of express train service. Quite rightly, however, New Zealand railwaymen and enthusiasts are very proud of their own services, and particularly of such trains as *"The Night Limited,"* which runs between Auckland and Wellington. They are familiar with the difficulties of the wild country traversed, the endless winding curves and the stiff climbs, and the deep canyons that must be carefully negotiated. The construction alone of the main trunk route of the North Island, over which this train runs, was a great achievement, and all credit is due to the men who made it possible.



Crossing the Hapuawhenua Viaduct, New Zealand, a steel trestle 147 ft. high and 932 ft. long. The accompanying photographs and that on which our cover is based are by courtesy of the New Zealand Government Railways.

In order to see what New Zealand can do let us take a trip on *"The Night Limited,"* a regular service connecting Auckland with Wellington. Every evening at 7 o'clock it glides away from the northern city, and at 9.30 a.m. next day it arrives at its destination, dusty and travel-stained after completing a gruelling journey of 426 miles through the night, including the negotiation of a mountain section with an altitude of 2,659 ft.

So we enter the spacious and splendid Auckland terminus. This new station, replacing the original structure of 1884 that had become quite inadequate for modern requirements, was opened in November 1930, and cost £365,000. There are seven platforms, each 900 ft. long. It is obvious as we make our way in that one of the chief events of the railway day is about to take place. Cars are arriving in quick succession, and "red caps" or licensed porters are busily shepherding passengers and their baggage through the big entrance hall to the departure platform.

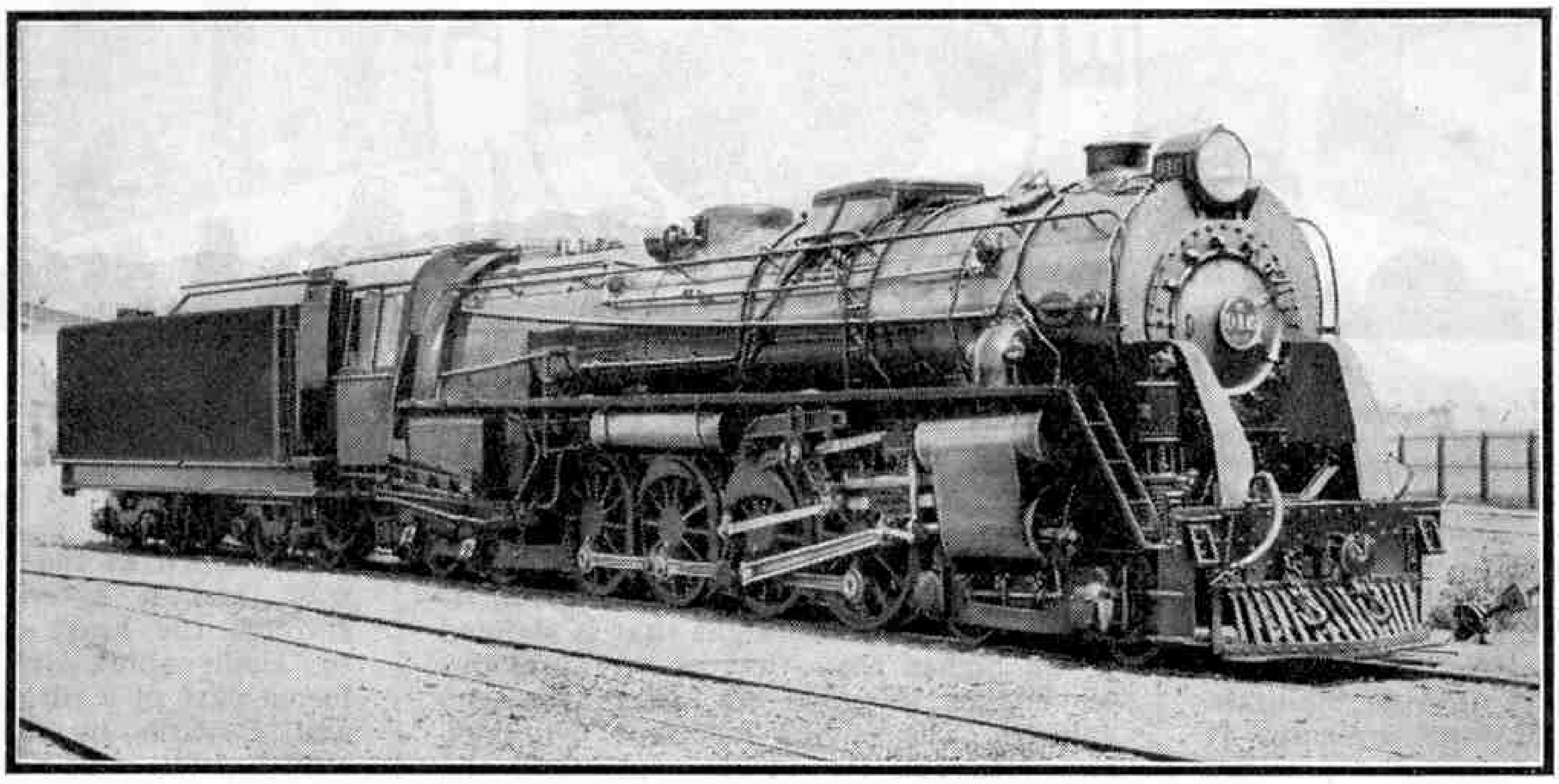
Alongside platform No. 1 waits the "Limited," spick and span in its shining coat of maroon. The train is made up to eight cars, with a large luggage brake van at the rear displaying the three tail lights that indicate a through express train. Three sleeping cars, of which two are particularly luxurious, three first-class and two second-class coaches, comprise the passenger section of the train. Let us walk the length of the train and see what engine is being coupled on. We notice with enthusiasm that it is one of the new giants of the "K" class, of which we are particularly proud, for they are local products and were built at the Hutt Valley shops at Wellington. These powerful locomotives have the 4–8–4 wheel arrangement, and in general appearance are not unlike many U.S.A. types.

As the time of departure draws near, the platform exhibits the usual scenes of animated bustle. Meanwhile, on board the train, those who are not to enjoy the comforts of a "sleeper" are making themselves as comfortable as possible for the night. *"All Aboard"*; the bell clangs its final warning; porters close the vestibule doors; then comes the guard's whistle, the exchanging of last greetings, and with a whistle blast from the "K" we draw away from the platform.

At first we cannot help doing nothing but watch the view, for the route out of Auckland is very beautiful. The track lies by way of the harbour front, and in the fading glow of the evening light the smooth waters of the Waitemata and the bright little waterside residences present an attractive picture indeed. Soon, however, we are speeding along at 40 m.p.h., and then we head away inland, making for the Waikato Valley through which much of the first part of our journey is made. Now we have a chance to look about us and to take stock of the coach in which we are travelling. It is an end-vestibule, centre-corridor car, with seats on each side of the "gangway," the seating capacity being 40 persons. There is plenty of leg room, and the seats are well sprung and splendidly upholstered. The windows are wide, giving the maximum opportunity for sightseeing.

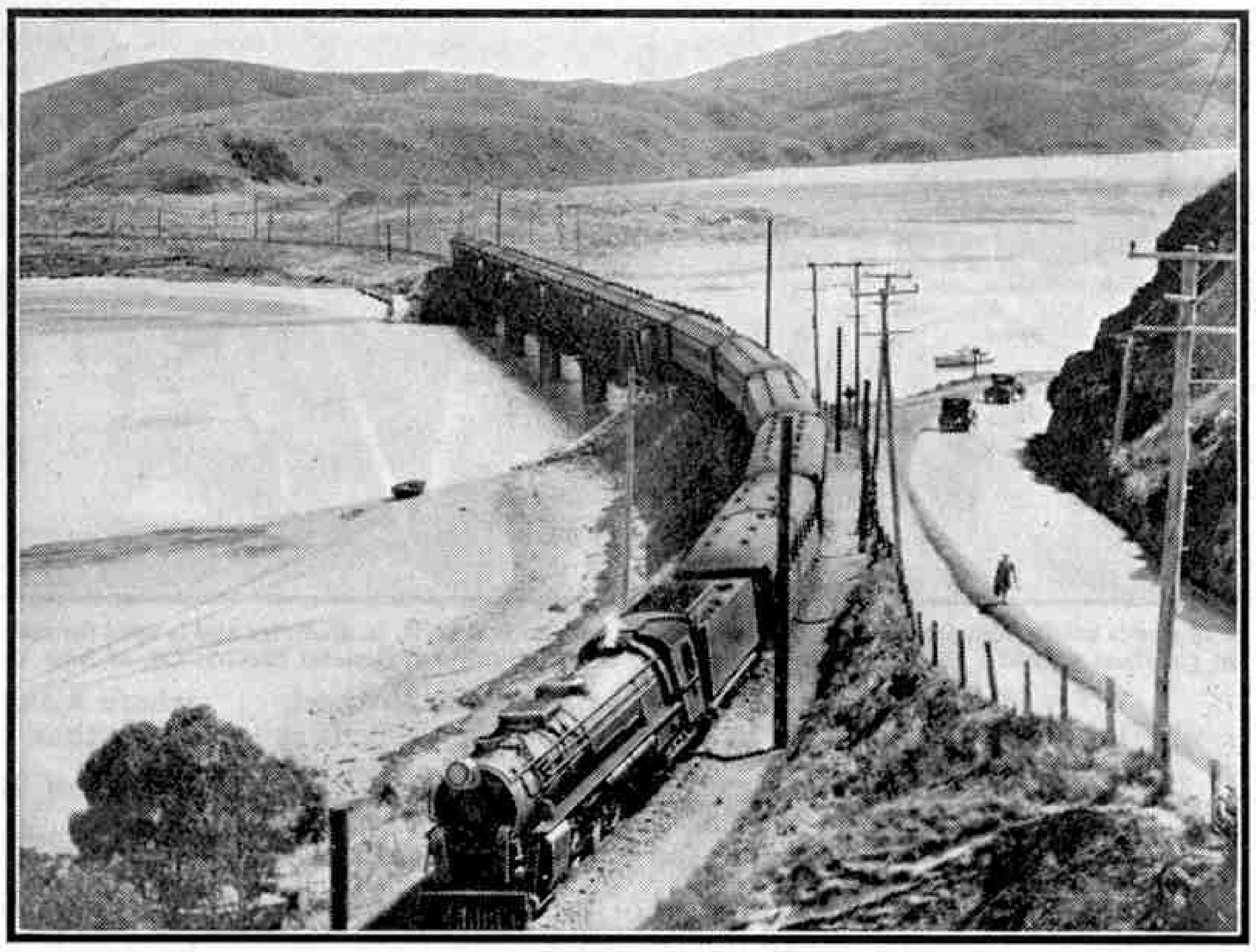
In view of the high development to which the service has attained, it comes as something of a surprise to recall that only since 1908 have Auckland and Wellington been connected by rail, the first regular service commencing in 1909. The schedule then was 19 hrs. 10 min. for the 426 miles, but to-day's best is 14 hrs. 10 min., largely as a result of post-war development.

For the first 100 miles the gradients of the route are comparable to those of British main line track, and a satisfactory average can be maintained. At 9.10 p.m., therefore, we make our first stop at Frankton Junction, a distance of 89 miles from the start. Frankton is a very important place, and from here main lines diverge for the Thames Valley and Rotorua districts. Eight minutes are allowed here for refreshments. There are no dining cars in New Zealand, but an efficient catering system ensures that travellers can obtain refreshments en route at specially-equipped rooms on the station platforms.



New Zealand 4-8-4 locomotive No. 916 of class "K." Locomotives of this class are used on "The Night Limited" and other important trains, both passenger and freight.

The next stop of importance is at Taumaranui, 136 miles from Auckland, and this is reached in the early hours of the morning. Few passengers alight this time, as most are dozing; but we must get out and see the fresh engine that will be coupled on to act as a pilot. This turns out to be one of the "Wab" class locomotives of the 4–6–4 tank type, the position of the side tanks over the driving wheels being an advantage on the frost-covered lines of the next section. We are about to enter on the most rigorous stage of the journey as far as the enginemen are concerned. From Taumaranui to Waimarino, a distance of 32 miles or so, there is a difference in levels of 2,636 ft. to be negotiated by our train.



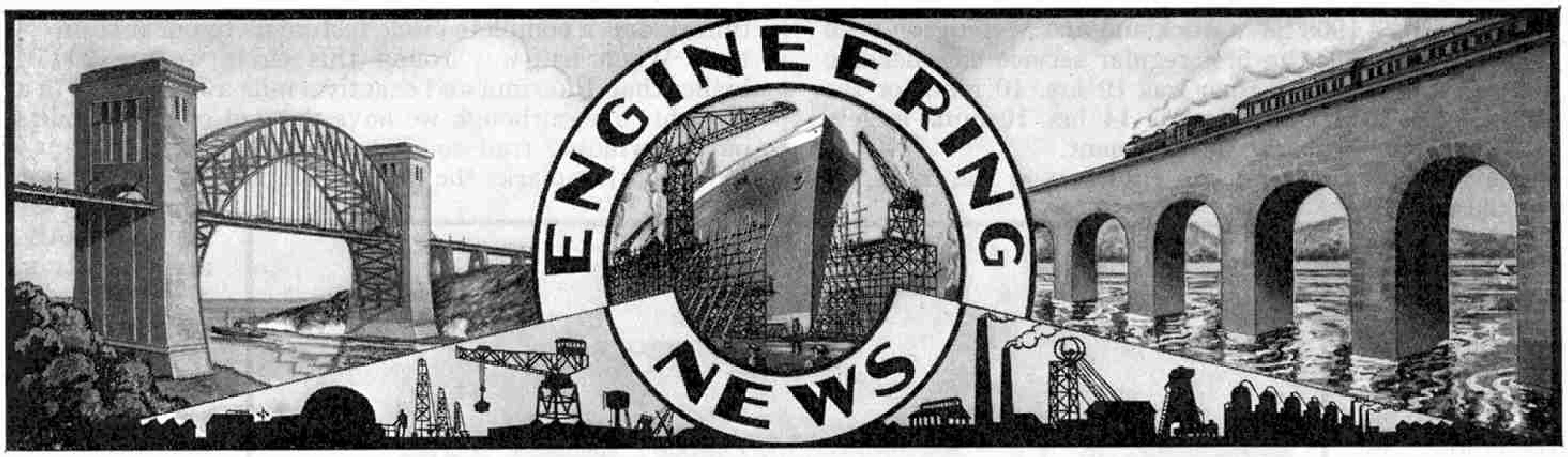
The Auckland to Wellington "Limited" express crossing the Paramata Bridge near Wellington. The train is hauled by a locomotive of class "K."

At the commencement of the last and steepest section of the ascents is Raurimu. Here we are approaching the famous spiral by means of which the line is carried higher and higher, literally up the side of the mountain. We run past the station and then double back, passing it again at a higher level. Immediately we thread a sharp curve on a 90-ft. high embankment, and reaching the straight again, roughly at right-angles to our original course, we are 100 ft. above Raurimu. Another curve, a tunnel, and a complete circle restore us to our first direction. When half-way round this circle we are 200 ft. higher than Raurimu and exactly a mile away from it in a straight line, although we have covered over four miles on our winding trail since passing through there.

Waimarino marks the end of this stretch of climbing. Now we descend slightly, and then attain a greater altitude than before at Pokoko, 2,561 ft. above sea level. Over the next 10 miles or so we descend, and then commence climbing again, finally reaching the summit at Waiouru at an altitude of 2,659 ft.

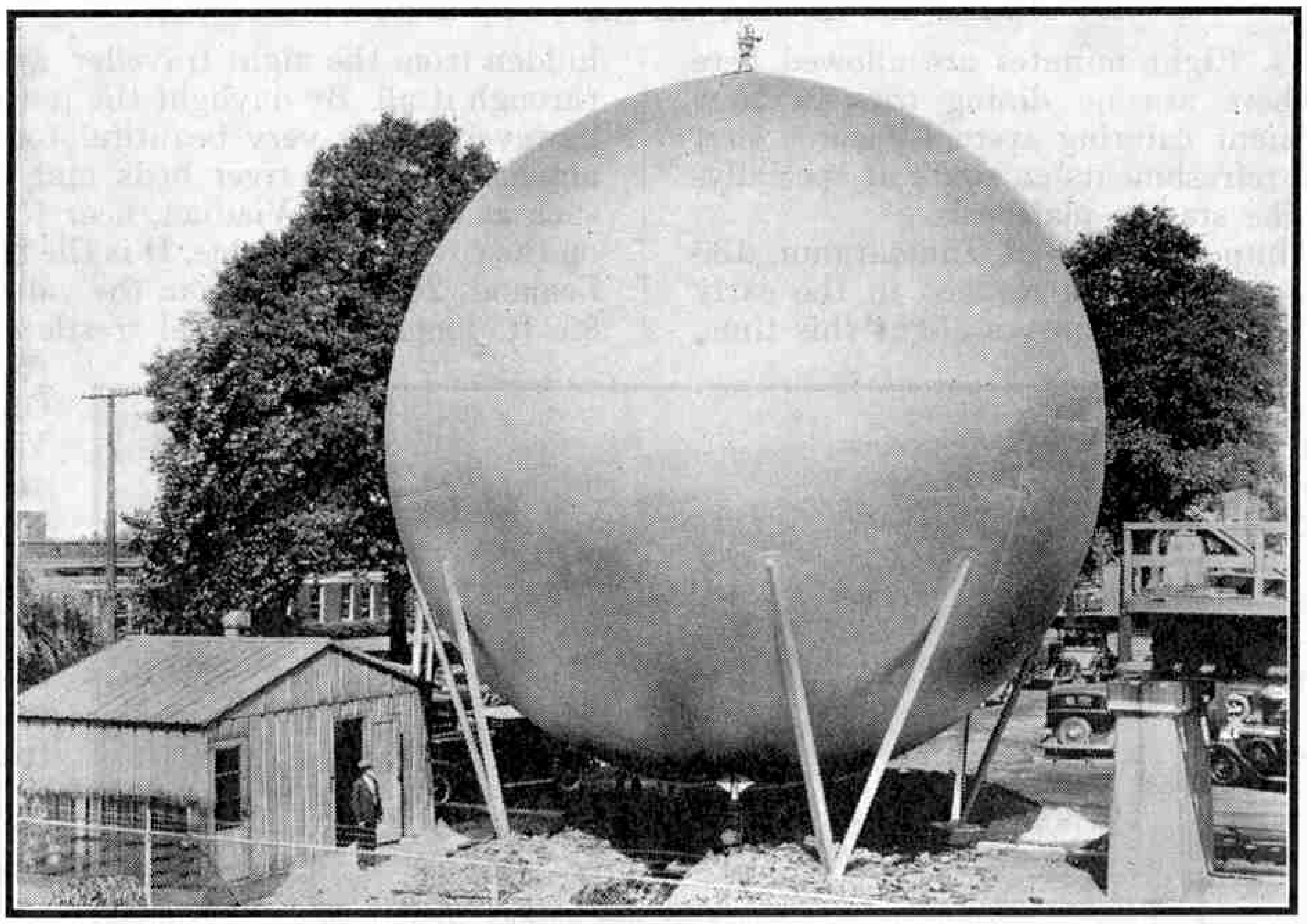
The marvels of this section of railway are hidden from the night traveller, and he peacefully sleeps through it all. By daylight the journey is full of interest, however, and is very beautiful, for the line winds its way among bush-clad river beds and across giant viaducts such as Makatote Viaduct, near Raurimu, that is shown on the cover of this issue. It is the highest viaduct in New Zealand, 260 ft. high from the valley to rail level, and is 860 ft. long. It is of steel trestle construction, and cost £53,000 to build. Beyond Ohingaiti is Makohine Viaduct, 238 ft. high and 750 ft. long, which cost £72,000 to build, and necessitated the use of 7,000 tons of concrete to enable construction to be commenced on a solid foundation. The train runs for miles in perfect view of the highest mountain in the North Island, the snow-covered Ruapehu, 9,175 ft. high, and it is also possible to see the active volcano Ngarahoe. Then there is the strange geological formation of Mangaweka Gorge.

By the time daylight comes the most difficult country is left behind, and we find ourselves cruising along at a comfortable speed through rich pasture lands. Breakfast, a stand-up one, is to be had at Palmerston North, another busy junction. At Paekakariki we reach the sea again, this time the rolling waters of the Tasman Ocean. There are more hills to negotiate, but time is kept, and at 9.30 a.m. sharp, with a shrill whistle as though of relief, we emerge from the last of eleven successive tunnels and there, almost at our feet, stretches the basin-like harbour of Wellington.



A Huge Welded Sphere

The illustration on this page shows a steel sphere 36 ft. in diameter that was constructed by means of electric arc welding. The sphere was built by the Chicago Iron Works and is installed at the Cleveland works of the International General Electric Company of New York, where it is used to maintain natural gas at a constant pressure. It holds 74,000 cu. ft. of gas at a pressure of 29 lb. per sq. in., and is built up of steel segments 5/16in. thick. The segments were cut and formed in the makers' workshops, and were then transported to the site on which the sphere was to be erected, where they were welded in position.



This huge sphere is made from steel segments arc-welded together. It is 36 ft. in diameter and is used for maintaining gas at constant pressure. Photograph by courtesy of the International General Electric Co. of New York.

World's Longest Concrete Arch Span

A concrete bridge now being constructed across the Esla River in Spain will have a central arch with a span of 627 ft., which will be the longest reinforced concrete arch yet erected. At present the record is held by the span of the Traneberg bridge in Sweden, with a length of 585 ft. This bridge was described on page 951 of the *"M.M."* for December, 1934.

The arch of the Esla bridge will be a hollow structure divided by concrete partitions into three compartments. Its width at the crown will be 25.9 ft. and at the abutments 29.7 ft., and it will carry a double railway track. In building the bridge a total of 39,200 cu. yd. of concrete and 1,100 tons of steel will be required.

Chinese Port to Rival Shanghai

The Chinese Government are constructing a new harbour on the north side of Hangchow Bay, south of the port of Shanghai. This is to be known as the Great Eastern Harbour, and will take 15 years to complete, at a cost of about £4,000,000. It will be more convenient of access than Shanghai, and ships will be able to enter it at all states of the tide, instead of having to wait for high water as at the older port.

An Oil Engine Power Record

A new light-weight oil engine made by Norris, Henty and Gardners Ltd., Patricroft, is noteworthy for the extensive use in its construction of special steels and alloys. These have given it a ratio of power to weight that is claimed to be higher than that of any previous oil engine intended for road transport vehicles. The engine has four cylinders, and although its weight, excluding the electric starting motor and a light flywheel, is only 575 lb., the power developed is 53 b.h.p. at 2,000 r.p.m. The engine is therefore ideal for use in light chassis.

Novel Scheme for Pedestrian Crossings

In a new system of pedestrian-actuated traffic control now being tested on the Kingston by-pass on the London-Portsmouth Road, a beam of invisible light falling on a photo-electric cell operates the traffic lights. With the signals at present in use, pedestrians who wish to cross must press a button switch in order to stop vehicular traffic. Experience has shown that many people hesitate to assert their rights in this manner, but with the new system they will do so unconsciously by interrupting the invisible beam as they approach the crossing.

The Highest Motor Road in Europe

A remarkable new Austrian highway that is claimed to be the highest motor road in Europe is now open to traffic. It is known as the Gross-Glockner Highway, and it extends from Zell-am-See through the heart of the Austrian Alps to Heiligenblut, in Carinthia. Thus it forms part of a direct link between Italy and Bavaria by way of Austria. The road is 16 ft. wide and rises to a height of 8,200 ft. above sea level, yet the gradient is nowhere greater than 1 in 8. At one point where wonderful views are obtained there is parking space for about 100 cars and 20 coaches, and in many places spaces described as sidings have been provided to enable motorists to draw up without interfering with traffic.

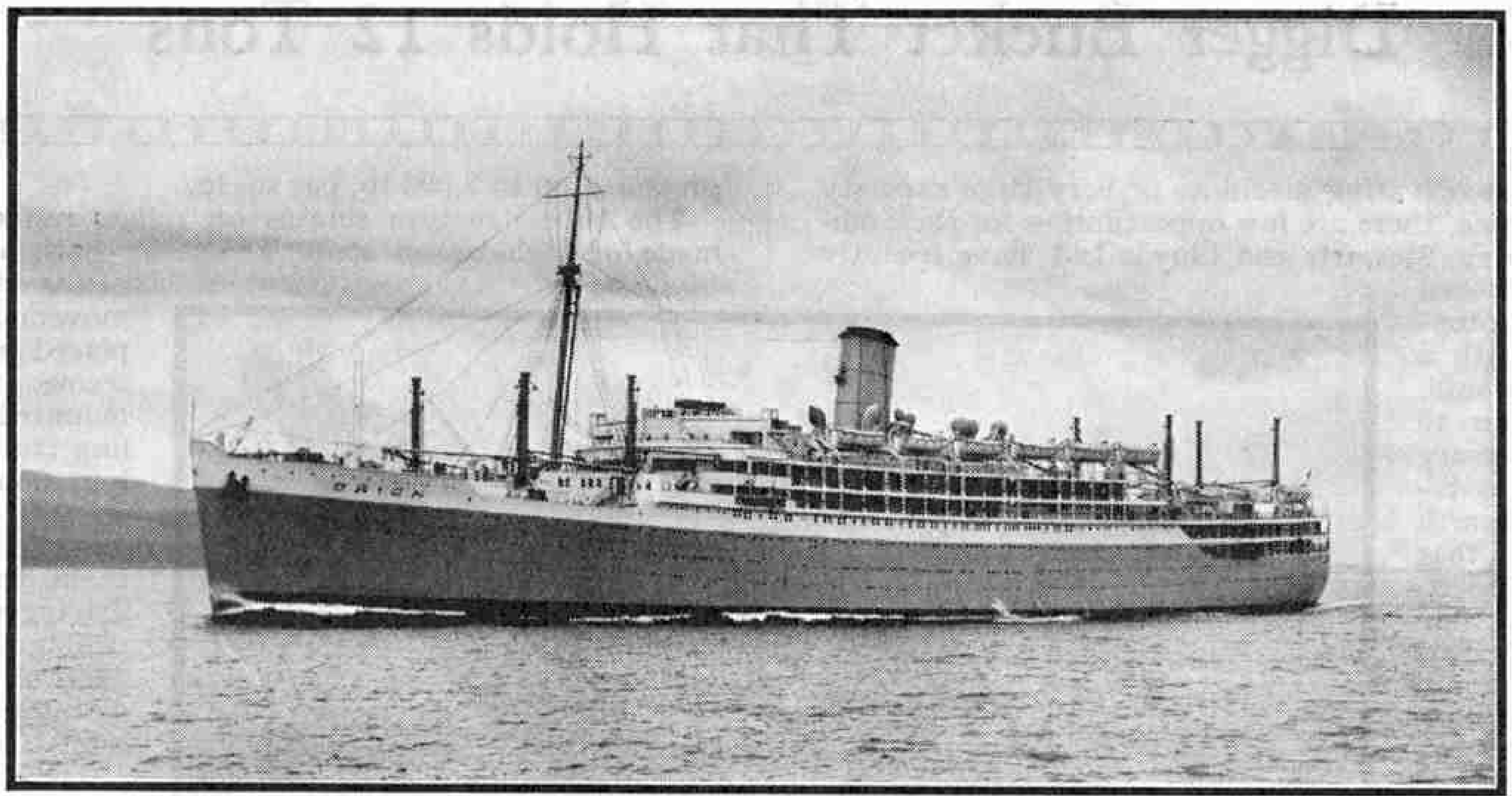
Construction of the road was begun in 1931, and more than 3,200 men have been constantly employed in excavating the foundations through rough and trackless territory thousands of feet above sea level. The successful completion of the Highway is a triumph of modern road engineering. The opening ceremony was performed at a point where a magnificent view of 37 peaks, all more than 9,500 ft. high, is obtained.

Range of Italian Radio Station Increased

The Italian Ministry of Communications recently increased the equipment at the radio station at Coltano by the provision of a new short-wave transmitter with a wavelength range of 13-100 metres. The output of the transmitter to the aerial is 56 kW on continuous-wave telegraphy and 35 kW on telephony. It is one of the most powerful of its kind in the world, and has been introduced for the purpose of enabling Italian vessels far out at sea to keep in touch with their own country. An important feature of the installation is the provision of special apparatus by means of which any one of four wavelengths employed can be brought into operation almost instantly.

New British Liners

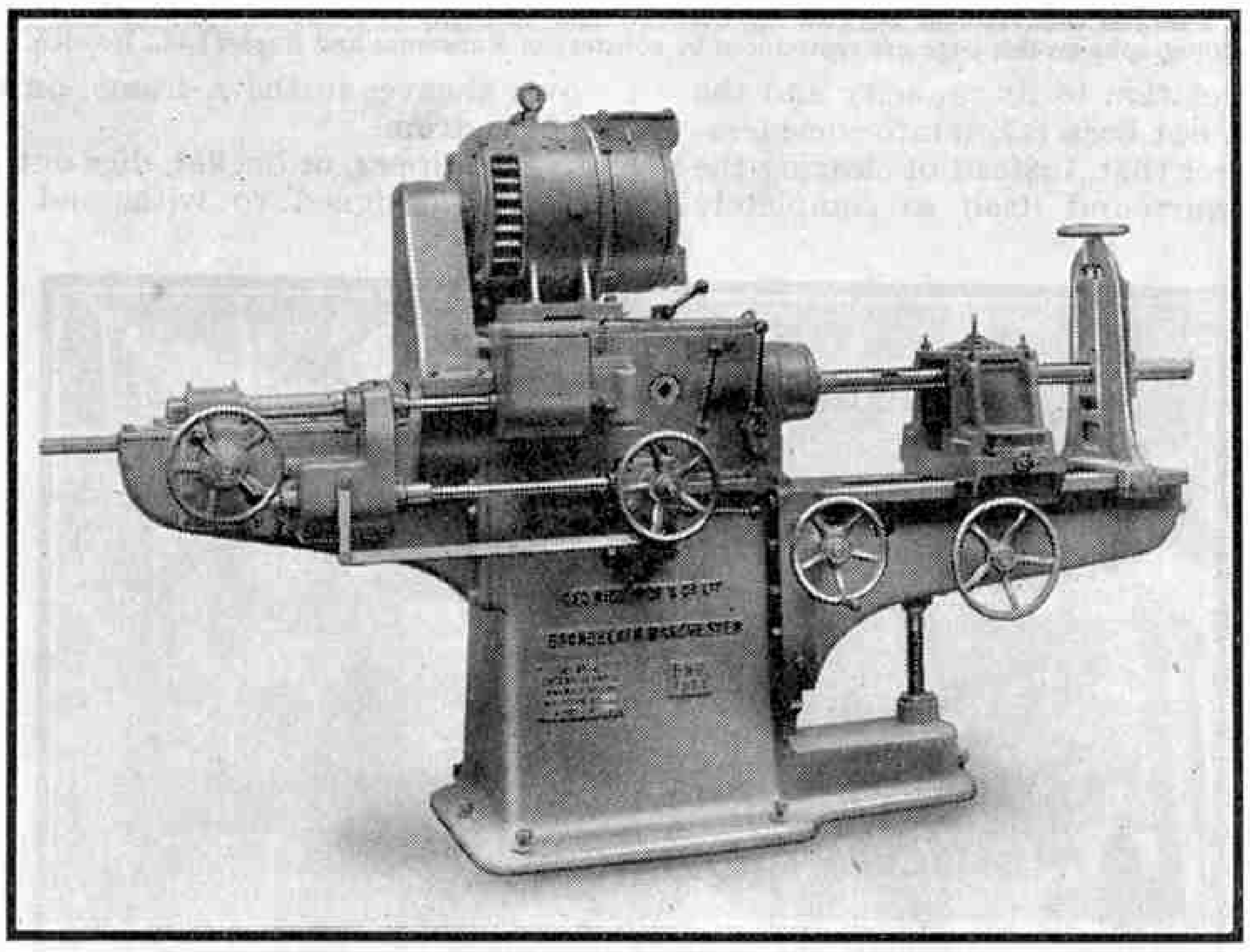
Britain's merchant fleet has recently been augmented by the *"Orion"* and the *"Strathmore,"* built in Barrow-in-Furness by Vickers-Armstrongs Ltd. to the orders of the Orient Line and the Peninsular and Oriental Steam Navigation Co. Ltd. respectively. The two vessels are of the same general dimensions, and are of particularly dignified external appearance. The *"Orion"* is illustrated on this page, and it is interesting to recall that she was launched by wireless by the Duke of Gloucester during his recent Australian tour.



The new turbine-driven mail, passenger and cargo ship "Orion," recently placed in service by the Orient Line. Photograph by courtesy of Vickers-Armstrongs Ltd., Barrow-in-Furness.

Each of the new liners is 665 ft. long and 84 ft. in breadth, and has a gross tonnage of 23,370. Their engines develop 24,000 shaft horse power, and their designed speed is 21 knots. The propelling installations are practically identical, each consisting of two sets of Parsons turbines driving twin screws through double-helical reduction gearing. The boiler plant consists of six Babcock and Wilcox high-pressure generators that supply steam at 440 lb. per sq. in.

Work is now proceeding on the fitting out of the Union Castle liner *"Stirling Castle,"* which was launched a few weeks ago at the Belfast yard of Harland and Wolff Ltd. This is the largest passenger vessel launched in Great Britain since the *"Queen Mary."* Her gross tonnage is 25,000, and she has an overall length of 725 ft. and a breadth of 82 ft. Accommodation will be provided for 300 first-class and 500 cabin-class passengers, and provision will be made for an insulated cargo-carrying capacity of 330,000 cu. ft., which will be devoted to fruit and chilled or frozen products. The propelling machinery will consist of twin screw double acting two-stroke oil engines, each of which will have 10 cylinders. The ship will be equipped with the "Harlandic" electrical time system, which was described on page 333 of the June 1935 *"M.M."* The clocks controlled by this system can be set to give correct local time, whatever the direction in which the ship is travelling.



A horizontal boring machine for boring carriage and wagon axle brasses. We are indebted for our photograph to George Richards and Co. Ltd., Broadheath, Manchester.

Electric Heating for American Dam

Electric heating units are being constructed by the International General Electric Co. of New York for incorporation in the gates of a new dam now being erected across the Mississippi River near Canton, Missouri. The main gates of the dam will consist of giant rollers or drums, some of which will be 109 ft. in length and 20 ft. in diameter. These will be placed horizontally across the river, with their ends resting in bearings built into concrete piers; and they will be so arranged that each drum can be partially rotated and raised in order to vary the rate of flow of water. The heating units will be fitted into the ends of the rollers and in the bearings, and their purpose is to keep the rollers free from ice during winter and early spring.

Driving a Road Through a Mountain

An outstanding feat of modern engineering was completed recently when a new viaduct road between Penmaenmawr and Llanfairfechan, North Wales, was opened to traffic. The new road replaces an old road built by Thomas Telford, the famous engineer, and it provides a passage for traffic round a towering precipitous mass of rock near the edge of the sea. The road is cut from the mountain side and has a length of 3,000 ft. and an average width of 34 ft. At one point it crosses a deep gorge on a seven arched viaduct at a height of 100 ft. above sea level, and in another place it passes through two tunnels cut through the mountain, one of which is 185 ft. long and the other 115 ft. The bases of the viaduct piers are only 10 ft. from the sea.

Machine for Boring Axle Brasses

The lower illustration on this page shows a horizontal boring machine manufactured by George Richards and Co. Ltd., Broadheath, Manchester. It is designed to machine white-metal lined axle brasses, such as are used on wagons and carriages, and is intended for use in railway workshops. The machine is driven by a self-contained 5 h.p. electric motor placed on top of the main frame, which carries on one side a bracket for the boring spindle tail, and on the other a second bracket on which the work holder slides. The work holder can be moved along the bracket as required by rotating a handwheel, and can be adjusted to suit different sizes of brasses.

The spindle that carries the boring tool is driven through a gear-box providing four spindle speeds, ranging from 59 r.p.m. to 300 r.p.m.; and a friction clutch is placed between the motor and the gear-box so that the machine can be started or stopped while the motor is running. Two brasses are bored in one operation and are held down by a plate bolted to the top of the work holder. The main bearings are continuously lubricated by a gear driven oil pump incorporated in the machine frame.

A Fine Dutch Canal Completed

The Queen of Holland recently opened the Princess Juliana Canal that has been constructed in the south of Holland. The canal has a length of 20 miles, a width of 52 ft. and a depth of 16 ft., and ships up to 2,000 tons can use it. The canal is crossed by 11 bridges, all of which leave a clearance of at least 23 ft. above the surface of the water.

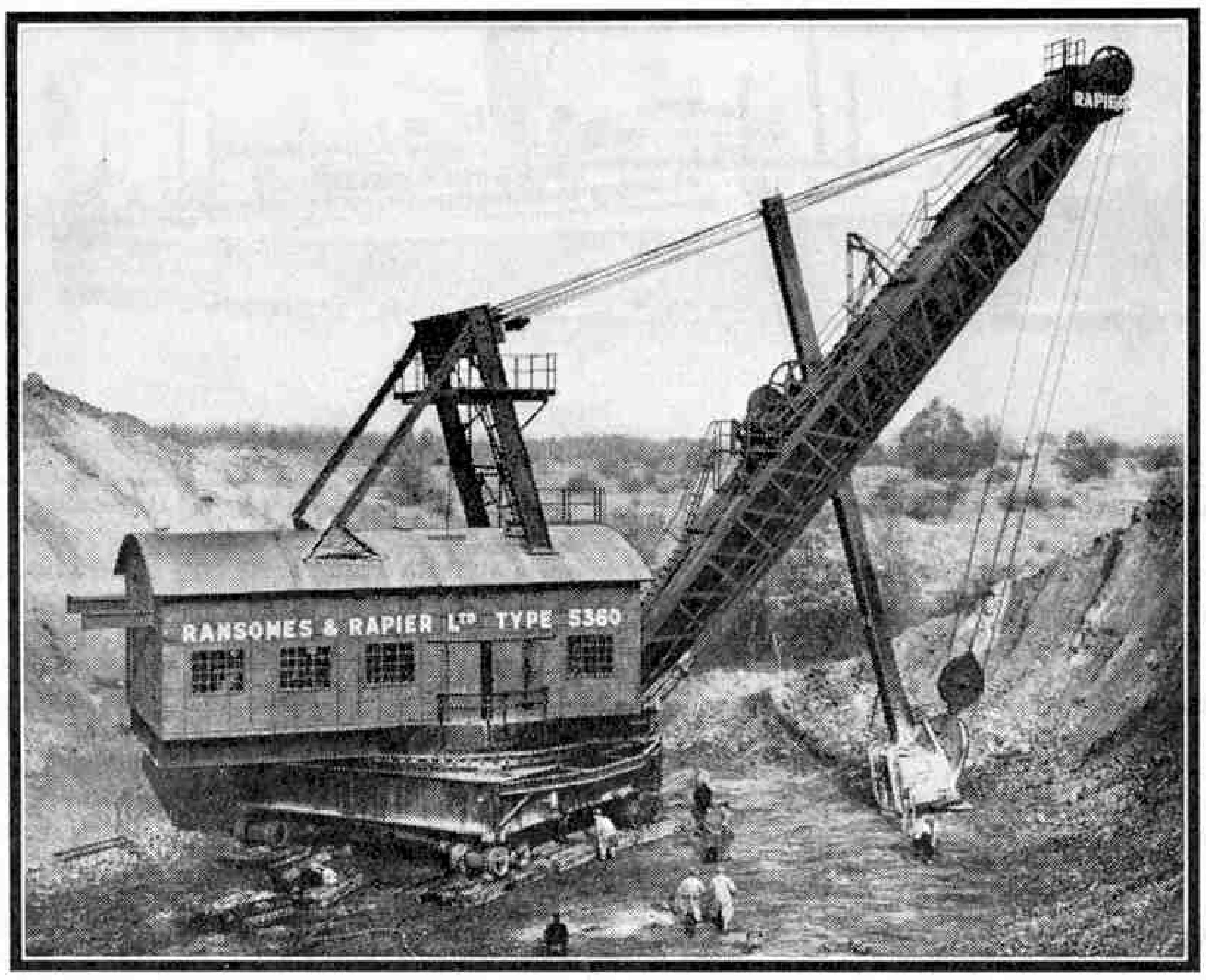
The Institute of Marine Engineers

Arrangements are now being made for the next annual examination for admission to the grades of Probationer Student and Student of the Institute of Marine Engineers. The grade of Probationer Student is open to engineering apprentices and students between the ages of 17 and 20 attending approved educational centres; and that of Student to those under 25 years of age who have had, or are receiving, a recognised training in engineering or shipbuilding. Examinations in the two classes will be held at various convenient centres in June, 1936, and full particulars and copies of the syllabus for each examination can be obtained from the Secretary, the Institute of Marine Engineers, The Minories, London, E.C.3.

Europe's Largest Shovel Excavator

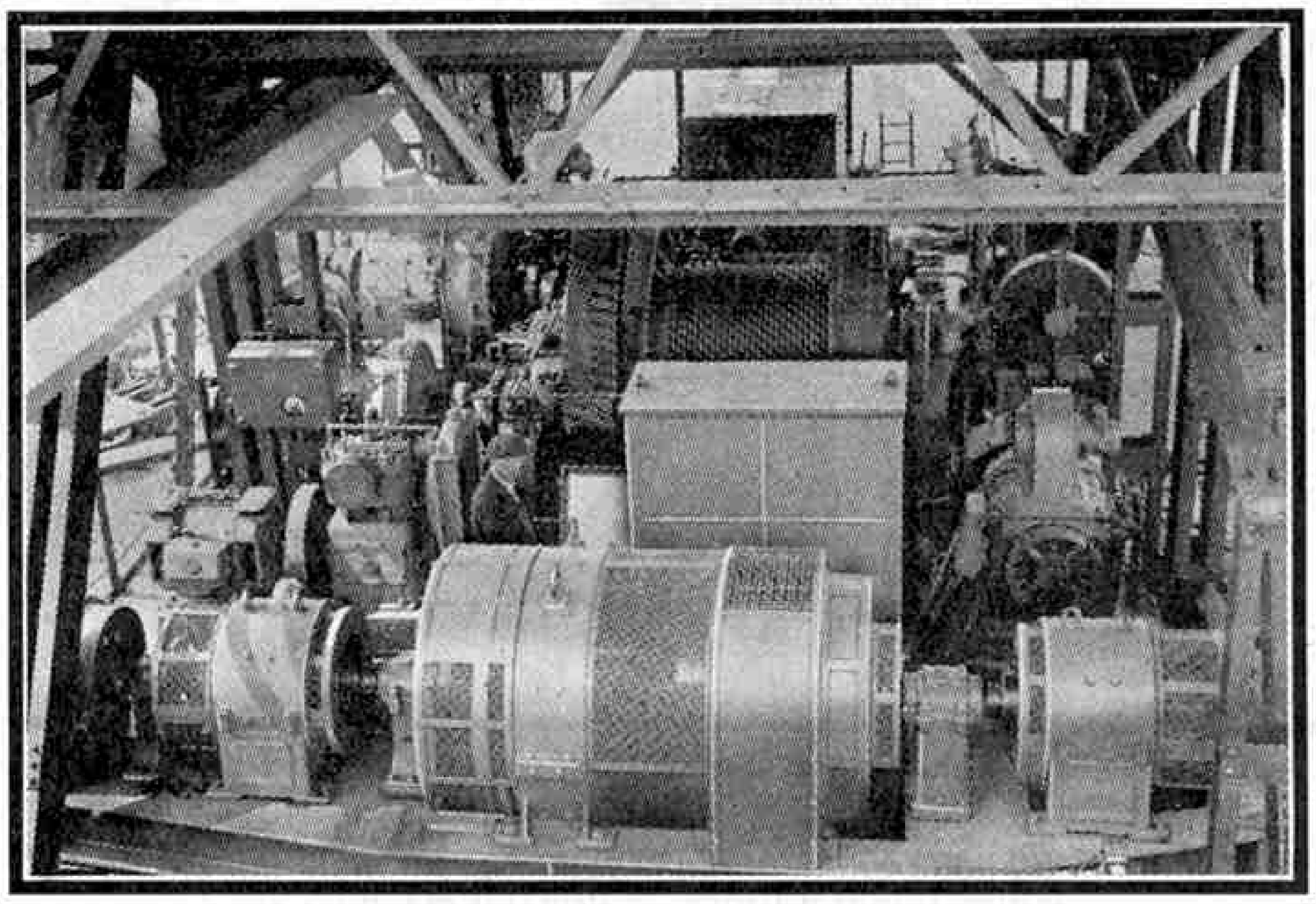
Digger Bucket That Holds 12 Tons

ALTHOUGH giant excavating machines of very large capacity are in use in America, there are few opportunities for their employment in this country. Stewarts and Lloyds Ltd. have recently opened a new iron-ore bed at Corby, Northamptonshire, in connection with a large new tube-rolling mill, however, and in order to get at the ore it is necessary first to remove an overburden, or covering of earth and unwanted material, that varies from 45 ft. to 55 ft. in depth, and covers a wide area. To accomplish this work the owners of the mill placed an order with Ransomes and Rapier Ltd., Ipswich, for a giant electric excavator with a dipper or bucket of 9 cu. yds. capacity. This machine is illustrated on this page and is the largest shovel excavator yet made in Europe.



Europe's largest excavator at work in the iron ore mine at Corby of Stewarts and Lloyds Ltd. The photographs on this page are reproduced by courtesy of Ransomes and Rapier Ltd., Ipswich.

Material that has been excavated occupies a greater volume than when it is in the solid form, before being dug out of the earth. The increase in volume is known as "swell," and varies with different materials. Particular attention had to be given to this point in designing the machine, so that it would have plenty of room to operate in relation to its capacity and the height of cut attempted. If this had not been taken into consideration there would have been the danger that, instead of clearing the site, the machine would actually surround itself so completely with spoil as to become useless. To render such a contingency impossible the machine was designed with a dumping height of 70 ft. and a working radius of 103 ft. The maximum cutting height above ground level is 80 ft., and the cutting radius at this height is 100 ft.



The machinery platform of the excavator shown in the upper illustration. The massive winding drum can be seen near the centre of the photograph.

The total weight of the machine is about 600 tons, yet in spite of its great size it is remarkably easy to control and is driven by one man. The machine in use at Corby travels on rails laid on the rough surface of the exposed bed of ironstone, but the excavator can equally well be mounted on crawlers when desired. The lower frame is built up of structural steel and steel castings, and is in the form of a square, the sides of which are formed of four massive box girders, braced together by a centrepiece that carries the centre castings.

As the ground over which a machine equipped with crawlers works may be uneven, and the rails on which the second type runs may be at various heights, a patent hydraulic levelling mechanism consisting of four special hydraulic rams is incorporated in the design. The main hydraulic pump for operating these rams is motor-driven, but there is an auxiliary hand pump in addition, and as a failure in the hydraulic circuit might have serious consequences, the piping is extra heavy, the fittings being suitable for pressures up to 2,000 lb. per sq. in.

The superstructure rotates on rollers round a centre journal made of high-carbon steel. The roller path and the 30-ft. diameter rack on which this movement is effected are placed on top of the lower frame, which in turn is mounted on four swivelling trucks. Each truck has four double-flanged wheels, all of which have spur gears, cast integral with them, that engage with the driving pinions on the propelling shafts. The machine operates on two sets of working track, one on each side.

The boom of this giant machine weighs 90 tons and is 94 ft. in length. It is made of steel, but the dipper arm or stick is made of steel and wood, a combination that gives not only great strength, but also the resiliency that is so desirable when the shocks imposed in working are encountered. The arm is composed of two members having steel armour plates on both sides and heavy steel bars on the top and bottom. The boom-hoisting rope, which is 4 in. in circumference, is led directly over sheaves in the A-frame, on top of the machine, to the boom-hoist drum.

The dipper, or bucket, digs out 12 tons of material at each stroke, and is designed to withstand the continuous wear and shock of excavating in hard material. The hoisting rope is 4¾ in. in circumference and is triple hitched to the dipper, then passing over sheaves at the point of the boom down to the hoisting drum.

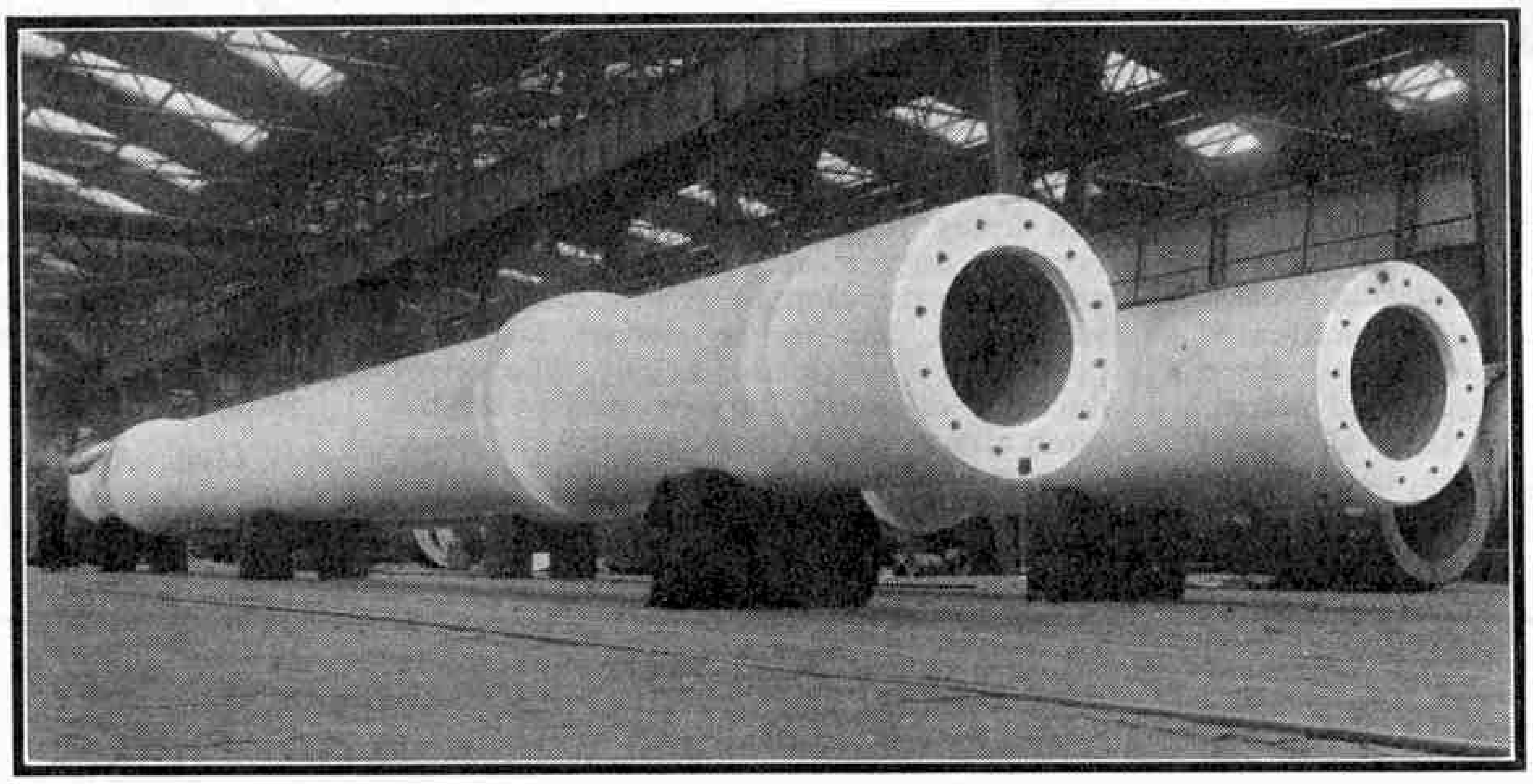
The main generator set is mounted on a fabricated-steel baseplate arranged for three-point support in order to avoid distortion of the shafts. The hoist motion is driven by two separate motors, each rated at 187 h.p.; the slewing motion also employs two separate motors, each of 62.5 h.p.; and a single 125 h.p. motor is used for the crowd motion, or digging the bucket forward into the material to be excavated and drawing it back. The electric equipment was supplied by the British Thomson-Houston Company Ltd., and operating current at 3,000 volts for the excavator is taken to the motors through a flexible trailing cable.

The winding drum is 48 in. in diameter, and is coupled to the drive when required by a contracting friction band. A check brake controls its movement when it is disconnected from the drive. This is automatically released through a magnet valve immediately the lever on the hoist control is moved from the neutral position, and the driver then takes control through a foot pedal that actuates a compressed air ram.

Russian Giant Hydraulic Press

Deals with Forgings up to 16 ft. Diameter

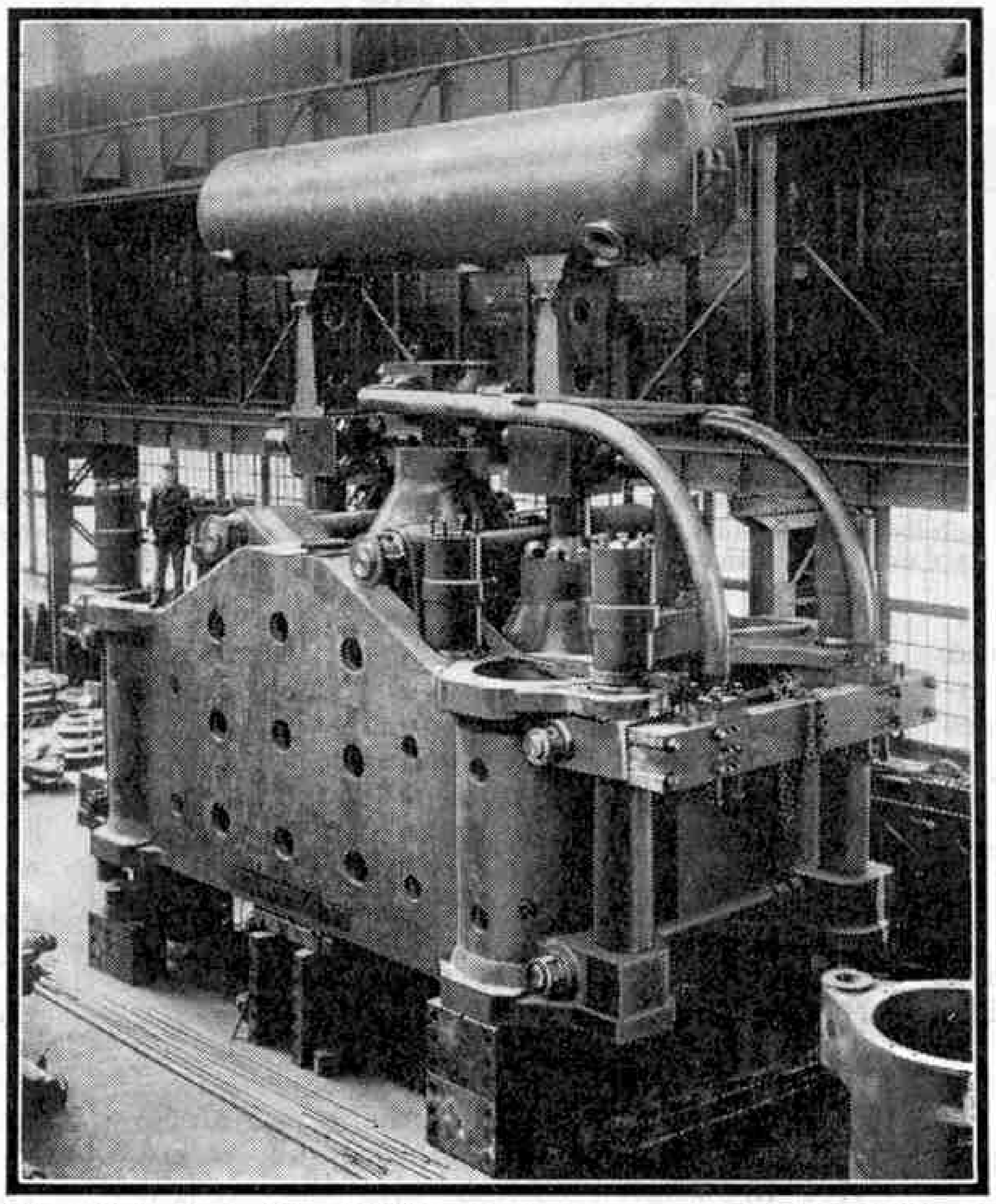
METAL parts used in the making of modern machinery and engineering structures generally are formed by one of three processes—casting, cutting from the solid by means of machines such as planes or lathes, or forging. Many components are forged and used in preference to ordinary castings or machinings because they are much tougher and less liable to fracture if subjected to sudden shocks. For forging the smaller parts either hand-manipulated tools or steam-operated hammers are used; but for large and heavy work powerful hydraulic presses, capable of exerting many thousands of tons pressure, are now generally employed. Some of these operate entirely on the hydraulic system, but in others the hydraulic pressure is generated by a steam-operated intensifier. In a steam-hydraulic intensifier of this kind the hydraulic plunger is forced downward in its chamber by means of a rod connected to a steam piston that operates in a steam cylinder and is acted upon by high-pressure steam. The resulting pressure from this arrangement is very much greater than that from a simple hydraulic press, in which water under pressure is pumped straight into the hydraulic cylinder to operate the plunger.



These huge hollow columns support the cylinder block and crosshead of the world's largest steam-hydraulic press, described on this page.

The largest steam-hydraulic press yet made is installed in a big engineering workshop in Russia. This giant is capable of exerting a pressure of 15,000 tons, and can accommodate forgings up to 16 ft. in diameter. The overall height of the press is 83 ft. and its total weight is about 3,500 tons. It was constructed by Schloemann Aktiengesellschaft, of Düsseldorf, Germany, and is used to forge ingots of metal weighing anything up to 300 tons. The press is very adaptable, however, and by means of two lower pressures with which it is provided it can handle small work and also can be used for finish forging.

The press is operated by three main rams, the centre and larger one of which exerts a pressure of 6,000 tons, and the two smaller, one on each side of it, each exert a pressure of 4,500 tons. With this arrangement, when the centre ram is used alone 6,000 tons pressure is obtained; the two outer rams working together give 9,000 tons pressure; and by working all the three rams in combination the maximum pressure of 15,000 tons is obtained.



The cylinder block of the 15,000 ton forging press, assembled in the builders' erecting shops. Photographs by courtesy of Schloemann Aktiengesellschaft.

The pressure of the main rams is taken by a crosshead that moves up and down the supporting columns and carries the forging tools on its under face. After this crosshead has made its downward pressure stroke it is lifted back to its upper position by eight draw-back rams, which are arranged in pairs at the sides of the main supporting columns. Four of these rams are always under pressure, and serve to counterbalance the weight of the crosshead and the tools. When all of the eight draw-back rams are in operation a draw-back pressure of 460 tons is available, but when necessary, as for instance when piercing of ingots is taking place, this pressure can be increased to 690 tons. Normally these rams work under a water pressure of 2,900 lb. per square inch, but this pressure also can be increased if necessary.

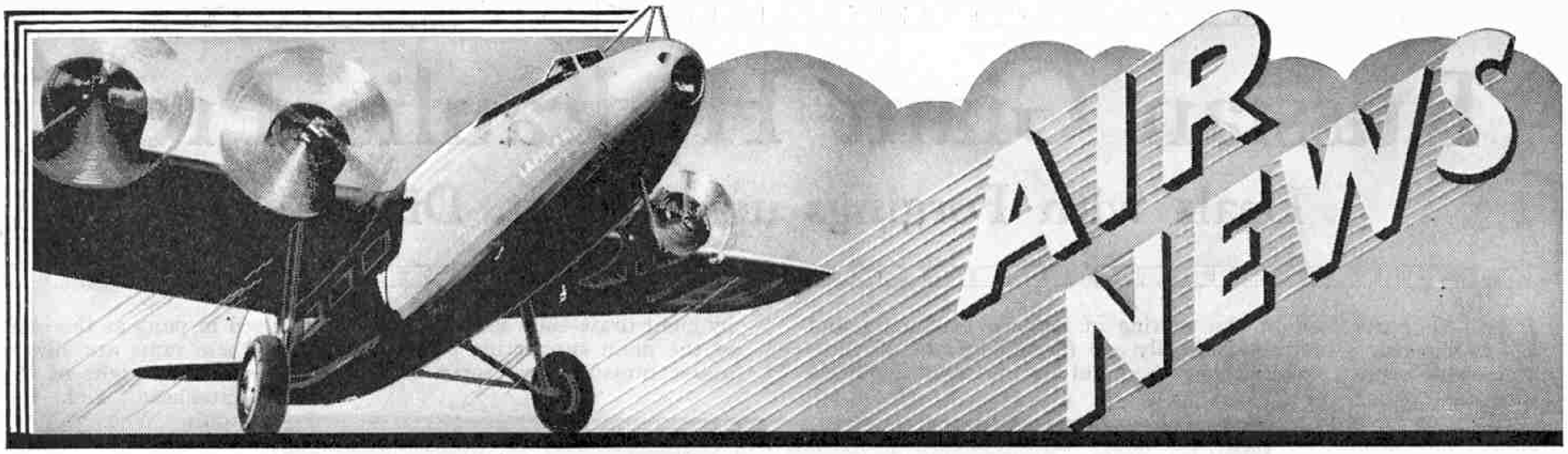
As it is an expensive matter to heat very large ingots of metal to forging temperature, the press is required to do as much work as possible during a single heat. This means that great blocks of red-hot metal sometimes remain under the press for long periods, and the moving crosshead and columns are subjected to intense one-sided radiation, which results in unequal expansion and stresses. In order to avoid damage to the press arising from these conditions the lower portions of the columns are water jacketed, and shields are fixed to the moving crosshead, which travel down with it and help also to protect the columns from the great heat.

The columns that support the huge cylinder block and crosshead are hollow forgings 3 ft. 10½ in. in finished diameter. They are believed to be the heaviest hollow forgings ever produced, and an idea of their great size may be obtained from the upper illustration on this page. The rough blocks from which the columns were formed weighed 240 tons each.

The main base casting is supported on two blocks that rest on the foundations, and above it there is a saddle provided at each end with brackets that carry the inner ends of bedplates, the outer ends of which rest on the foundations. The bedplates carry tables that can be moved in and out by means of hydraulic rams, and are used for handling hot ingots during the forging operations.

The crosshead has a maximum stroke of 9 ft. 9 in., and it can make five strokes a minute when engaged on heavy forging and up to 15 a minute on lighter finishing work.

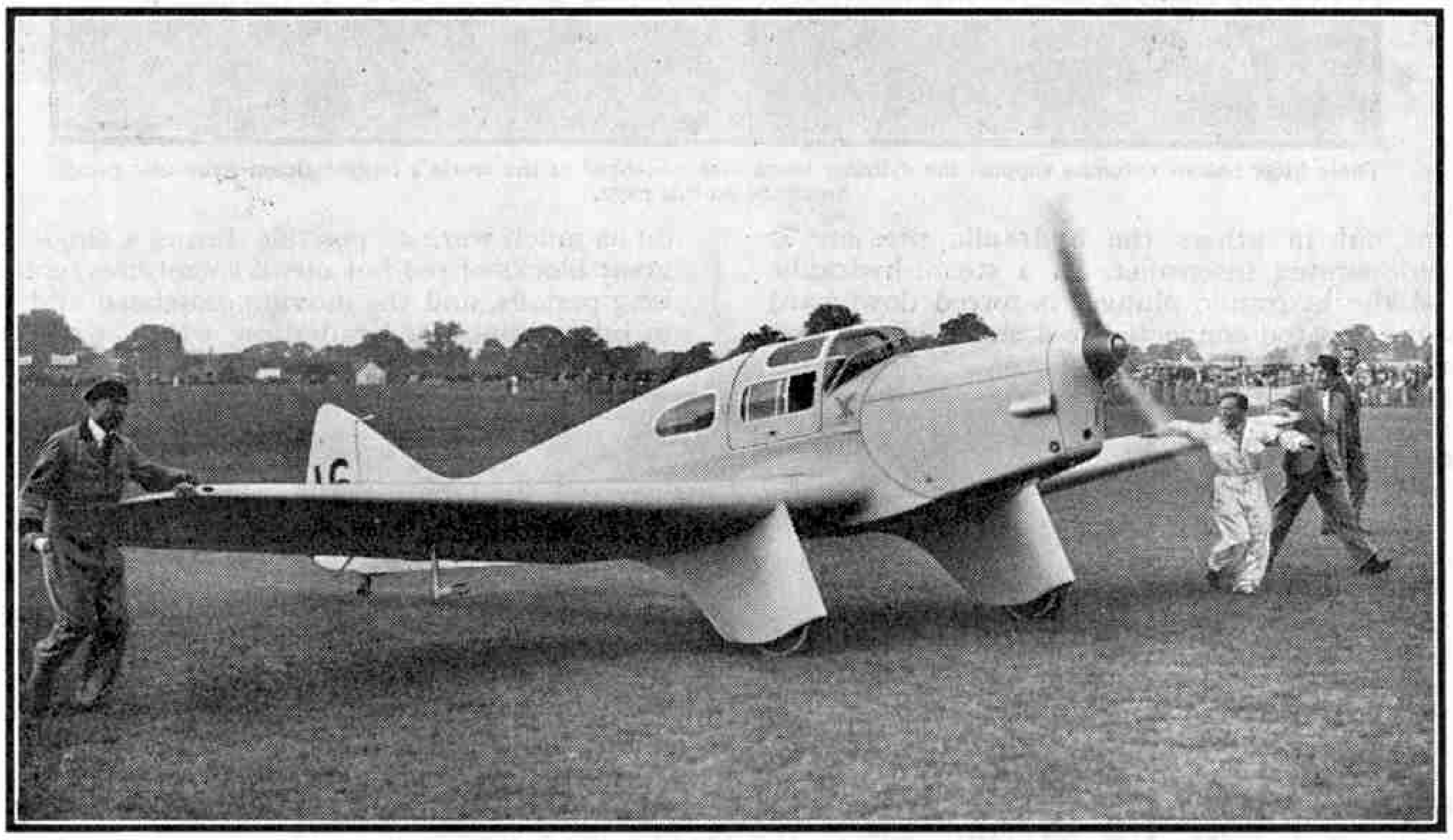
The hydraulic rams are operated by two pressure water systems. The draw-back and counterbalance cylinders are supplied with water at 2,900 lb. per sq. in. pressure, and this service supplies also the table rams and various other auxiliary hydraulic apparatus. The main rams are supplied with water at 5,800 lb. per sq. in. pressure from a double steam intensifier, each cylinder of which is 9 ft. in diameter.



Miles Aircraft Triumph

The King's Cup Race this year did much to disprove the old superstition that 13 is unlucky. Thirteen Miles aeroplanes took part in the eliminating contest on the first day, and of seven that graduated for the final on the second day, three captured the first, second and third places. This was the first time that all three winners in this annual race have flown machines produced by the same firm. The winner was Flt. Lt. T. Rose, and his machine, a Miles "Falcon Six," is illustrated on this page. The second and third places were won on Miles "Hawk Trainers," a new type that has just been approved by the Air Ministry for the R.A.F. for Service training. Miles aeroplanes are produced by Phillips and Powis Aircraft Ltd., Reading.

Another interesting feature of the Race was the very large majority of low wing monoplanes, 25 taking part; while there were only four high wing monoplanes and one biplane. This solitary biplane was an Avro "Avian," with Armstrong-Siddeley "Genet" engine, and it was among the 20 machines that completed the final course. The 19 monoplanes had either D.H. "Gipsy Six" or "Gipsy Major" engines.



The Miles "Falcon Six" piloted by Flight Lieut. T. Rose, landing at Hatfield aerodrome after winning the King's Cup Air Race on 12th September last. Photograph by courtesy of "The Aeroplane."

Aeroplane Flight in the Stratosphere

It is always interesting to speculate what progress will have been made in aviation a century or even 50 years hence, and the directions of that progress. The high speeds that can be attained by powerfully engined aircraft to-day will, no doubt, then be greatly exceeded. By flying through the stratosphere, a region of rarified air that begins at a height of about 10½ miles above the Equator and 5½ miles above the Poles, the aeroplanes employed on long-distance air routes will escape the adverse weather conditions now experienced as the result of flying at a height of only a few thousand feet.

The density of the atmosphere decreases as the height increases, and therefore an aeroplane flying at a great height encounters less atmospheric resistance than one flying low. The aeroplane does not become lighter as it climbs, however, and as the thinning air gives it diminishing support it has to be driven faster to prevent it from losing height. The introduction of superchargers and variable pitch airscrews has increased the efficiency of aircraft in this respect, but a great deal more progress will have to be made before aeroplanes can accomplish long-distance flights in the stratosphere.

In 1931 an experimental stratosphere aeroplane was produced by the Junkers aircraft factory, Germany. It was 93 ft. in span and 53 ft. in length, and special superchargers were fitted to the engine. The cabin was hermetically sealed to protect the crew against the intense cold in the upper atmosphere. No details of any success obtained with this machine have been made known.

More recently the F.1001, a large aeroplane intended for flights in the stratosphere, was built by those pioneers of aviation, the Farman Brothers, in France. It was a high wing monoplane and, except for the engine cowling and the airtight cabin, was made of wood. The wing was 71 ft. 6 in. in span and was supported above the fuselage by strong, inclined struts. The cabin was cylindrical in shape, with metal walls 1 in. thick, and it had a hinged roof with thick glass sides. The aeroplane was fitted with a 500 h.p. Farman water-cooled engine and two Farman superchargers.

Valuable research might have been carried out with the F.1001, but it crashed in a wood at Bonnieres, near Paris, during a demonstration flight on 5th August last, and the pilot was killed. An examination of the instruments in the cabin showed that the aeroplane had reached a height of 29,500 ft., which is just over 5½ miles.

Civil Aircraft Increasing Rapidly

According to the Directorate of Civil Aviation, of the Air Ministry, there were 6,300 civil aircraft registered in Europe at the end of June, or 459 more than at the end of March last. France has the greatest number, 1,933; Germany is second with 1,578, and Great Britain third with 1,297. The rapidly increasing total includes 173 different types of aeroplanes, and it is interesting to note which of them are at present the most popular. Junkers lead with a total of 145 machines, Fokker come second with 133, and de Havilland are third with 97. There is then a big drop in the figures to 32 Dornier aircraft and 28 Savoia, and smaller numbers of other types.

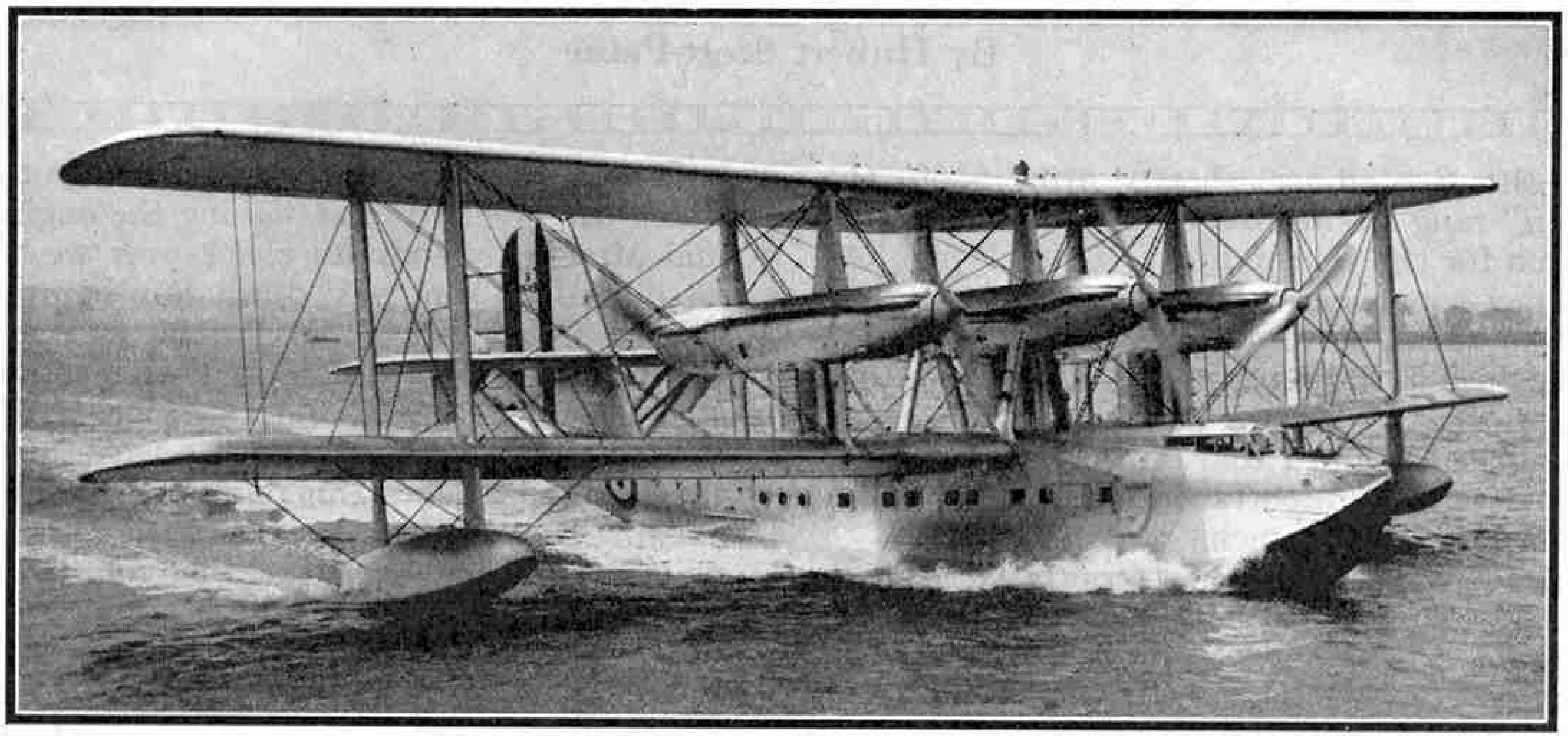
The chief air line companies have large fleets of aircraft, and it is rather surprising to find that the number of machines owned by European air transport firms is only about one-seventh of the total registered civil aircraft.

Lighting Imperial Air Route Across India

The aerodromes along the Karachi-Rangoon portion of the England-Australia Imperial air route are to be provided with G.E.C. lighting equipment to facilitate regular night flying. This part of the route is about 2,700 miles in length. The equipment will be similar to that in use at Croydon Airport, and will include boundary lights, rotating 1½-kW. route beacons, 9-kW. landing floodlights, and illuminated wind direction indicators. The aerodromes to have this lighting equipment include Karachi, Bombay, Calcutta and Rangoon.

Largest British Flying Boat

Until recently the Short *"Sarafand,"* shown in the upper illustration on this page, was on the Air Ministry Secret list, but details of it are now available. It was built in 1932 and is the largest flying boat in this country, having a wing span of 120 ft. and an overall length of 89 ft. 5 in. The *"Sarafand"* is a biplane flying boat of all-metal construction, and its six engines are placed in three tandem pairs, each pair carried on two inter-plane struts. The engines are 825 b.h.p. Rolls-Royce "Buzzards," of the medium supercharged type, and give the vessel a maximum speed of 150 m.p.h. Sufficient fuel is carried for a flight of 1,450 miles.



The Short "Sarafand," described on this page. It has a wing span of 120 ft., and is the largest flying boat in this country.

In the nose of the massive hull there is a gun station and a bomb aimer's position. The pilots' cockpit comes next and is totally enclosed, and the seat for the first pilot is placed in front of that for the second so that he can have as wide a view as possible. Then follow the officers' quarters, amidship gun positions, and the crew's quarters. A gangway leads to the extreme stern of the hull, where a gun can be mounted to protect the tail of the vessel.

The hull equipment includes a complete electrical lighting installation, a telephone inter-communication system connecting up nine call points, and a wireless telegraph set.

The "City of Alexandria," one of the Short "Calcutta" flying boats of Imperial Airways. It has been withdrawn from the Mediterranean service, and is to be used for training pilots for new flying boat services.

Vacancies for R.A.F. Apprentice Clerks

The Air Ministry announce that vacancies exist in the Royal Air Force for well-educated boys, in possession of an approved first school certificate, between the ages of 15½ and 17 years 3 months, to enter as apprentice clerks in January next. Preference may be given to candidates who will have attained the age of 16.

Successful candidates will be required to complete 12 years' regular Air Force service after reaching the age of 18. They will receive 18 months' training to equip them fully either as General or Accounting Clerks, and their general education will also be continued under a staff of graduate teachers. Further particulars can be obtained from the Secretary, Air Ministry (Apprentice Clerks' Department), Victory House, Kingsway, London, W.C.2. Other vacancies are to be announced shortly.

The New Zeppelin Airship

The new giant Zeppelin, LZ.129, under construction at Friedrichshafen, is expected to be ready for launching about the end of this month. This is much later than was anticipated last Spring, and her eagerly awaited maiden flight across the Atlantic will be deferred until next year. A brief description of this airship was given in these pages in the August issue.

Building of Aircraft Carrier *"Ark Royal"* Begun

The berth on which the battleship *"Rodney"* was built at the Birkenhead shipyard of Cammell, Laird and Co. Ltd., is being used for the building of the new British aircraft carrier *"Ark Royal,"* and the first keel plate of this vessel was laid on 16th September this year. She has been designed by Sir Arthur Johns, Director of Naval Construction, and although her dimensions have not been revealed it is known that she will exceed 100,000 tons and will carry at least 60 aeroplanes. The work will take about two years to complete, and electric welding will be used extensively for the hull. The estimated cost is £2,500,000.

The *"Ark Royal"* will be the second aircraft carrier to be built for the Fleet Air Arm of the British Navy, the first being the *"Hermes,"* launched at Elswick in 1919, towed to Devonport for completion, and later attached to the Mediterranean Fleets. There are five other aircraft carriers in service in the Fleet Air Arm, and three in reserve, but all were built as other types of ships and subsequently converted into aircraft carriers. One of the three vessels in reserve was, until recently, called *"Ark Royal,"* but has been renamed *"Pegasus."*

Important Indian Air Race

The air race round India for the Viceroy's Challenge Trophy, that was to have taken place last year, is to be flown in February 1936. It is being organised by the Aero Club of India and Burma, and the route to be followed by the competing machines is 1,485 miles in length. The places at which they will have to report during the flight include Bombay, Jodhpur and Delhi. The race will be restricted to British subjects and residents in India, and only British-built machines registered in the Empire will be eligible.

Soviet Successors to *"Maxim Gorki"*

A few details are now available concerning the 16 huge aeroplanes to be built in Russia to replace the *"Maxim Gorki,"* which crashed at an aerodrome near Moscow on 18th May of this year. They will be of 207 ft. span, 112 ft. in length and 36 ft. in height. Each machine will be fitted with six 1,200 h.p. engines, and will be capable of a maximum speed of 170 m.p.h.

The *"Maxim Gorki"* was an all-metal monoplane fitted with eight 850 h.p. engines, six of which were mounted in the leading edge of the massive wing, and two, arranged in tandem, in a nacelle above the fuselage. It was of 210 ft. span, attained a maximum speed of 149 m.p.h., and could carry 60 to 70 passengers when engaged on ordinary passenger-carrying work.

Airports in Finland

A scheme to link Stockholm, the capital of Sweden, with Helsingfors, the capital of Finland, includes the construction of three airports along the route, and the first of these was opened recently. It is situated at Artukais, Abo, Finland, and is the most northerly airport in Europe. Special attention has been given to the drainage of the landing ground, so that when the heavy winter snowfall thaws the water will be able to get away quickly.

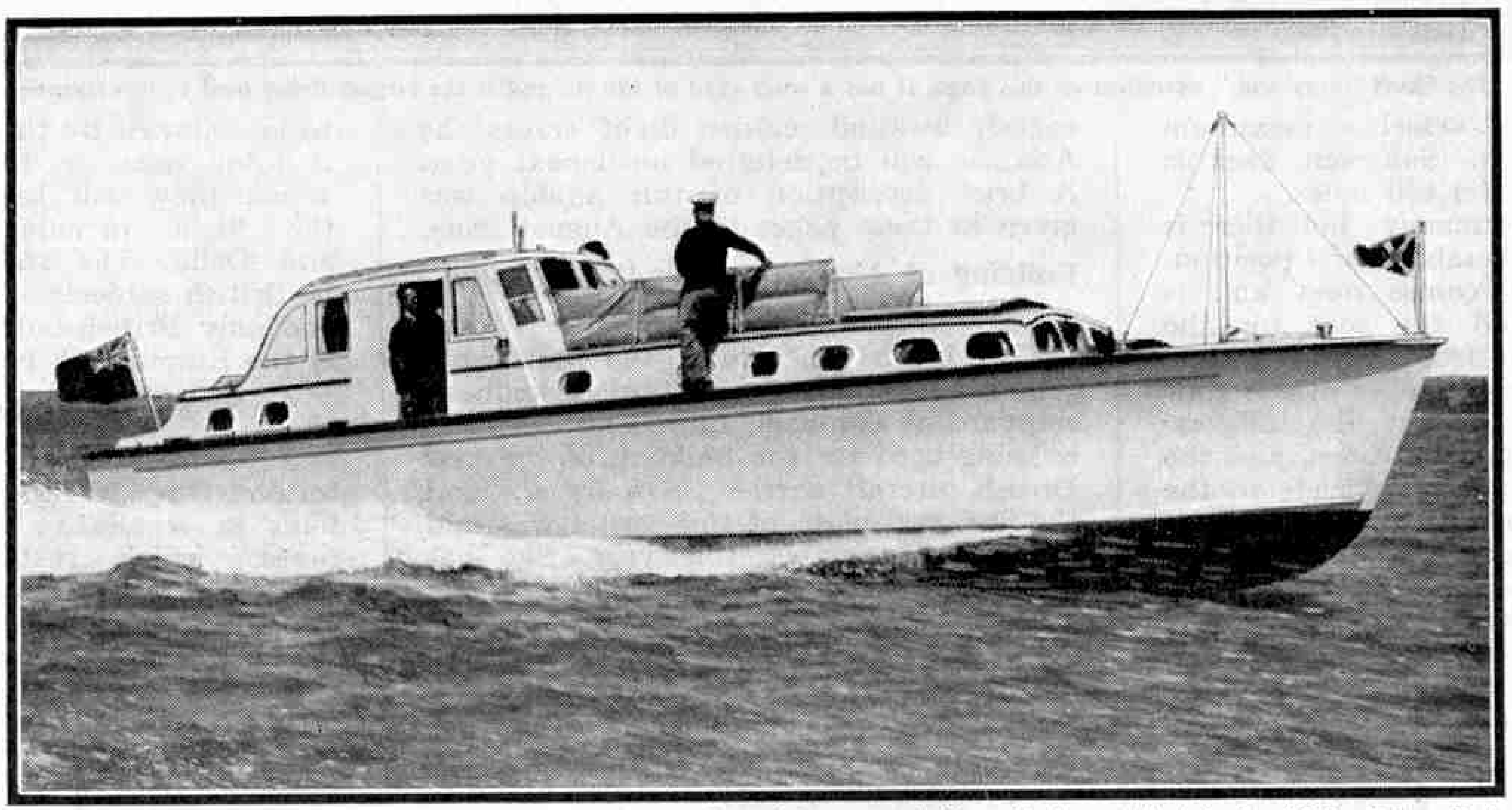
A Mid-Channel Dash by Motor Boat

Driving on in Darkness at 30 m.p.h.

By Hubert Scott-Paine

ON Friday, 6th September, shortly after noon, the *"Daily Mail"* rang me up to see whether it would be possible to search for the Orient Liner *"Orion,"* pick her up in the Channel somewhere southward of the Isle of Wight, and take from her an important package of pictures of the collision that happened to the *"Doric"* off the coast of Spain a day or two previously. It seemed to be an impossible task, and I told the *"Daily Mail"* so; but they insisted on the importance, and I told them I would let them know after lunch.

In the meantime I obtained weather reports, turned out charts, and sought local information of the *"Orion,"* which happily was a distinctive ship, having only one mast forward and being painted a corn colour all over her hull instead of the ordinary stereotyped black, and one funnel of a cream colouring. I found that her trial speed was 22 knots, and that she would probably be making up for lost time and steaming somewhere in the region of 21/24 m.p.h.


"Glitterwake II," Mr. Scott-Paine's 45-ft. Express Cruiser in which was made the mid-channel dash to the "Orion" described in this article. The illustrations are by courtesy of The British Power Boat Company.

With this information I laid off three courses that she would probably be following, and marked on these courses three probable positions against the three lots of speeds that I thought she might be using, and the three positions she would be occupying between 6 and 7 p.m., which was the information we had received as to her proximity to the Isle of Wight. I then laid out my own boat's speed and charted it, and decided on a diagonal course that, providing the information was reasonably accurate, would bring me ahead of her between 7 and 8 p.m., and with reasonable visibility would allow me to sight her between 7.30 and 8 p.m.

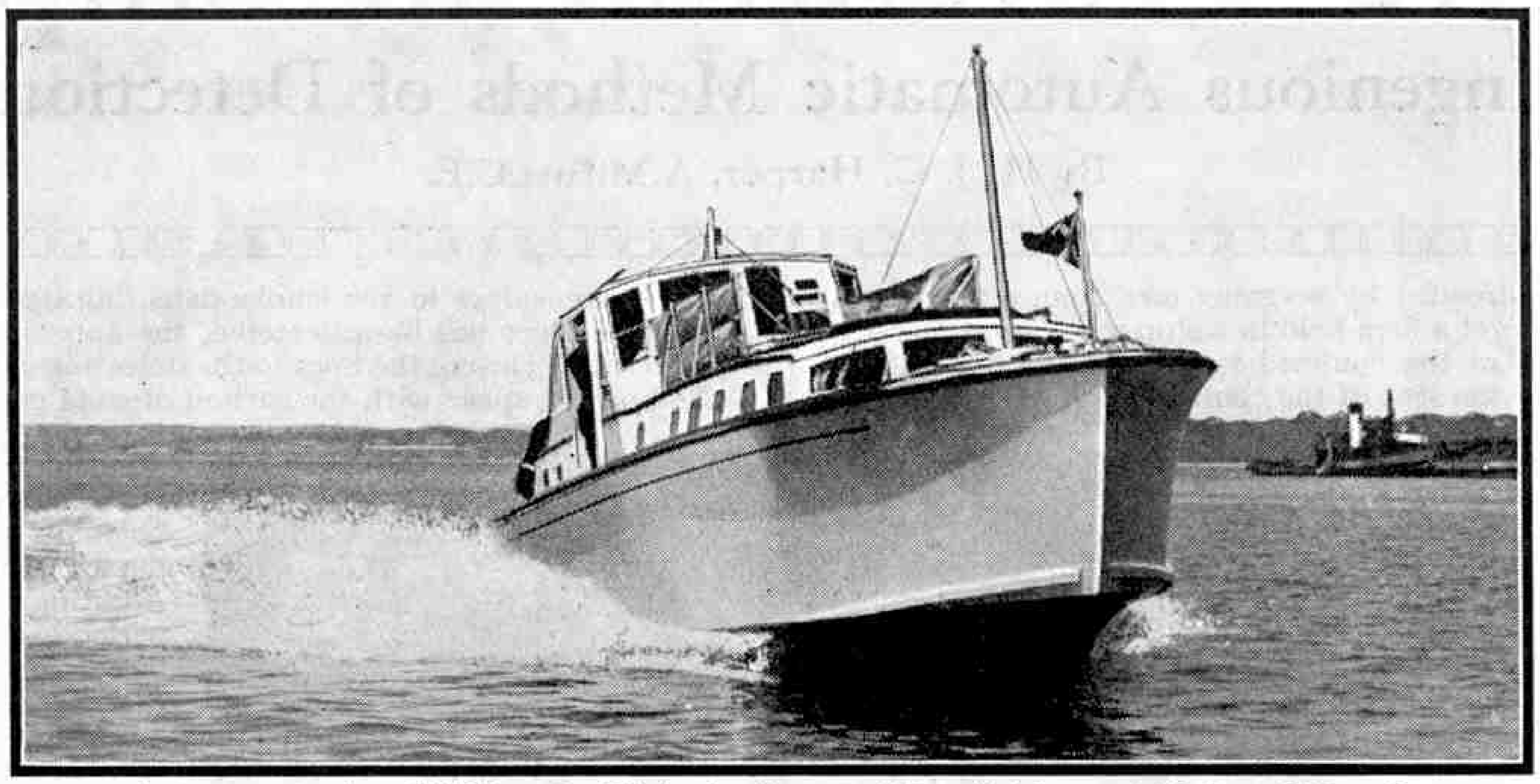
There was only one boat capable of carrying out this duty, and that was what is called a "Luxury Express" cruiser that I designed and built for myself for this year, and which I have named "Glitterwake II." She is between 45 ft. and 50 ft. long, engined with three 100 h.p. "Power" engines, and built by my company, the British Power Boat Co., the hull being similar to those that we supply to the Admiralty and which have proved so successful. The boat can be used in any weather, has a maximum speed of 33 m.p.h., and carries petrol for a radius of 240 miles at cruising speed.

It was not until 6.10 that we left Southampton. I had taken the precaution of having the engines warmed up, and after a five-minute check-over we were running at 33 m.p.h. on our way down Southampton Water. We cleared Calshot at 6.21, Portsmouth at 6.40, left the Warner Lightship at 6.50 and were at sea alongside the Nab Light Tower at 7.5. Our chase then had really started. I think we all felt the excitement of it by the time we had reached this point and were climbing up and running down the big heaves of the sea that was working up the Channel, with the rush of 33 m.p.h. and the darkness of night overtaking us.

As we were eating up the miles running on our S.E. course, doubts assailed me, resulting in frequent references to the chart; but I decided that the original planning was good, and told the boys as we brought the Nab Light Tower abeam that I should hold that course for 45 minutes, bringing her seaward of the island between 24 and 28 miles, and to all intents and purposes half-way across the English Channel. We sighted a small tramp on the up side of our course, and a little later brought down the smoke of another steamer, again on the up side.

A little later—and it must be borne in mind that we were covering more than a mile in two minutes, and the sea by this time had got deep enough for us to lose our horizon and the light was rapidly failing—we were beginning to become apprehensive of successful results. Once again we opened up smoke on our Channel side, that is the Dover side of our position, and undoubtedly this was a big ship now well seaward of the land, and on one of the three problematical courses that I had given the *"Orion."* The question was whether to alter course or carry on. I decided on the latter, and we were greatly relieved soon afterwards to distinguish that it was a P. and O. boat coming down channel, outward bound.

It was now 7.45 p.m., and five minutes off the time that I had given to hold course. At 7.47 my chauffeur-mechanic-friend Bill Sheaff thought he saw smoke on our down channel side, which was the first trace of life that we had seen on the side we expected to see it. This raised all our hopes, and with eager peering and glancing, and gymnastic balancing on the part of Jack Banks, whom we will call bo'sun of our outfit, we tried to get a better sight of the vessel. Our own movements, however, were so short and sharp in the seaway in which we now found ourselves that it was impossible to focus the glasses, which eventually were lost overboard!


A three-quarter view of "Glitterwake II" showing the powerful bow that is a special feature of this craft.

We were picking up a certain amount of spray on our starboard or down channel hand, and light and visibility were getting very bad. As we sped onward, having now been running at the limits of our engines' capabilities for nearly two hours, we all felt that if this were not our ship, with the failing light our chase would be unlikely to prove successful. Presently, taking a good look at the large ship as she now proved to be, I made up my mind that she was our quarry. In a few minutes this proved to be the case, and I went through all the emotional feelings that navigators invariably get at having made a good guess. Our time estimation had been right; our course had been right; the problematical course of the "*Orion*" had been judged correctly; and none of us would have changed places with the King!

Immediately I set to work with my searchlight to make our recognition signals, and you can imagine how delighted we were when, instead of receiving any return signal from the "*Orion*," we noticed that she immediately altered course and steamed towards us. At four minutes past eight we were to all intents and purposes alongside, encountering the terrific swell of the wash of the steamer, and at the same time noting that she had thrown overboard the package that we were to pick up. This package was a small barrel to which was made fast a weighted and floating staff with a white flag attached to it; and again attached to that was a calcium flare that immediately lit on contact with the water. We steamed slowly towards this, and the boys grabbed it with a boat hook, with the intention of cutting adrift the acetylene flare. I wanted that, however, as part of my souvenir of this now successful venture.

Mr. Hubert Scott-Paine, the famous motor boat designer and racing pilot, who tells the story of his exciting trip.

We gave ourselves 20 minutes to run over the overworked machinery, take a sounding of our petrol tank, check up on our bilges, and generally prepare for our return journey. We left our rendezvous position at 8.30 p.m. I then had to take the decision of running back at this very fast speed in our small but wonderfully-behaving boat, driving into a heavy quartering bow sea with all the risks and dangers that this entailed. I ordered the life jackets to be brought into the saloon, and having corrected all our check-ups we had some hot tea and bread and "bully," and started for home at a slightly less speed than on our outward journey.

At 8.40 we lost the last of the light from the setting Sun, and with an obscured Moon and heavy overhead clouds we were alone in the middle of the English Channel with no light of any sort. We did not open up a light until about 9.10 when we collected the Nab Light Tower, and to all intents and purposes my story finishes here. We left the Nab at 9.45, the Warner at 10.3, and Portsmouth about 10.15, and at a few minutes to eleven were up at Southampton Dock Head reporting our arrival. Our formalities finished with the Customs, our report to the "*Daily Mail*" headquarters, and their enthusiasm and thanks to my crew. In a few minutes we were under way again from Southampton Docks back to the factory, and had forgotten that for two hours previously we had been risking our ship, driving in complete darkness at a speed of close upon thirty miles per hour, entering into the "*Daily Mail's*" spirit of enterprise in trying at all costs to secure pictures of a world-famous incident in time for reproduction in the morning paper.

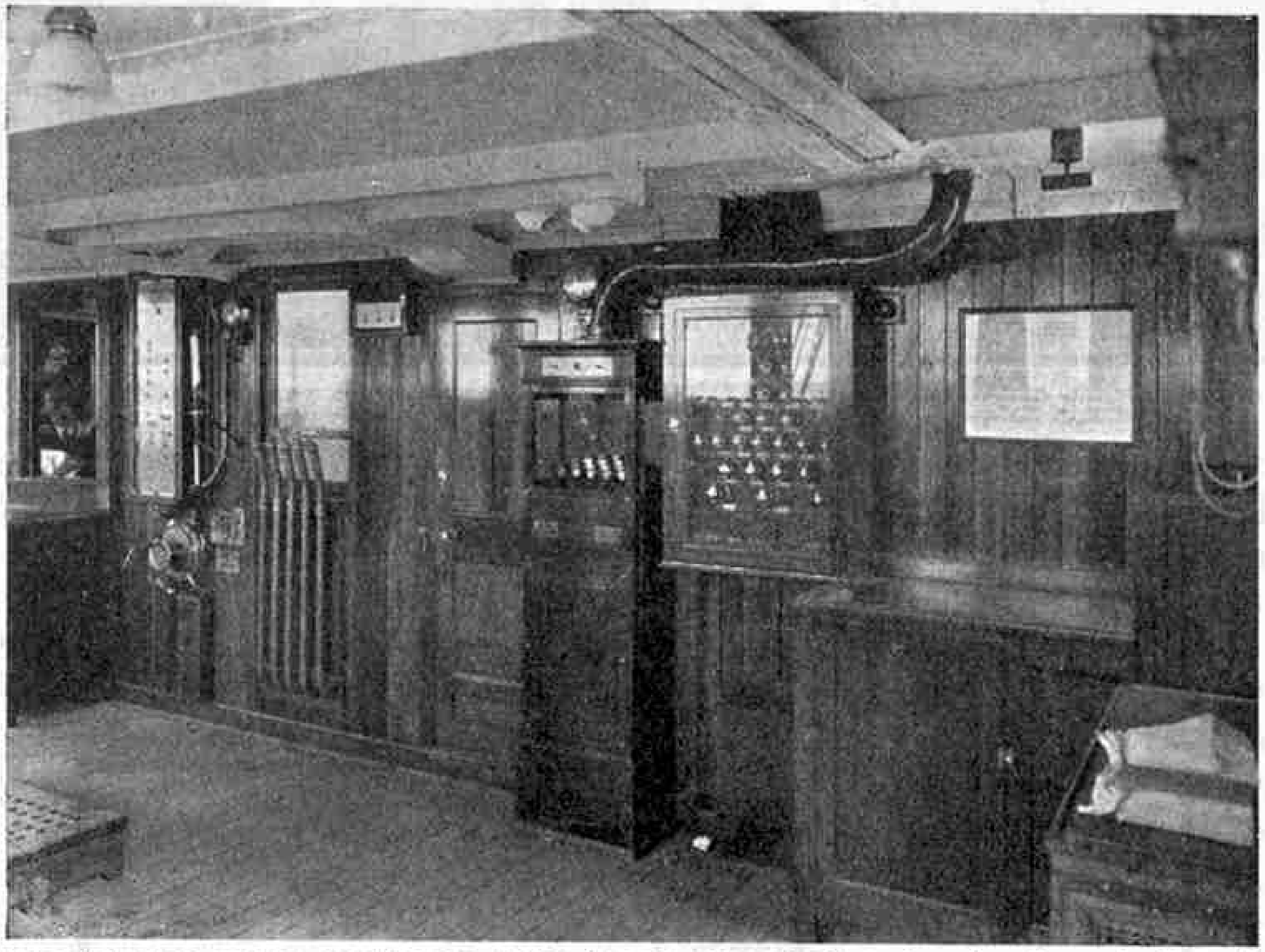
Fire Prevention in Ships

Ingenious Automatic Methods of Detection

By H. J. C. Harper, A.M.Inst.C.E.

NOTHING is more dreaded by seagoing men than a fire at sea, and once a fire has got a firm hold in a ship it is very difficult to extinguish on account of the confined space and the difficulty of getting near enough to the seat of the conflagration to deal with it. Fortunately means are now available for detecting fire in the early stages, and these have been adopted by a large number of ships, ranging from great liners such as the "*Berengaria*," "*Majestic*," and "*Europa*," down to many of the smaller cargo ships.

One of the most widely adopted means is the "Rich Smoke Detecting" system, which is used for the protection of cargo spaces. The system is based on the fact that a fire in a hold usually starts in a smouldering form, and although there may not be any great rise in temperature for many hours, smoke is almost bound to be formed, and this is utilised to give a warning. The apparatus consists of a small-bore pipeline led from each cargo space to a special detecting cabinet, usually located in the wheel-house, where it is constantly under the supervision of the ships' officers. An exhaust fan draws a sample of air continuously through each pipeline into the detector cabinet. A patented light beam system in the cabinet makes the slightest trace of smoke visible, and indicates the hold from which the smoke is drawn. Quick detection is helped by the fact that the exhaust smoke, after passing through the cabinet, is discharged into the wheel-house through a two-way valve in the ceiling, and therefore indication is obtained by smell as well as sight.


The detecting cabinet used in the "Rich Smoke Detecting" system for the protection of cargo spaces. Illustrations by courtesy of The Walter Kidde Co. Ltd.

The majority of the fire-detecting installations that have been fitted to liners and cargo vessels are of the visual type, but the "Richaudio," a recent improvement on the standard "Rich" detector, besides giving the same reliable visual warning of fire, also rings one or more alarm gongs. In the "Richaudio" detector the air samples are passed between a photo-electric cell and a source of light, periodically and one sample at a time. If there is any smoke in a sample, the amount of light reaching the cell is reduced, thereby causing the cell to operate the alarm bell and indicate the space in which there is trouble. A fire gong may be installed in the engine room as well as in the wheel-house, so that if there be no watch in the latter while in port, the alarm will be heard below.

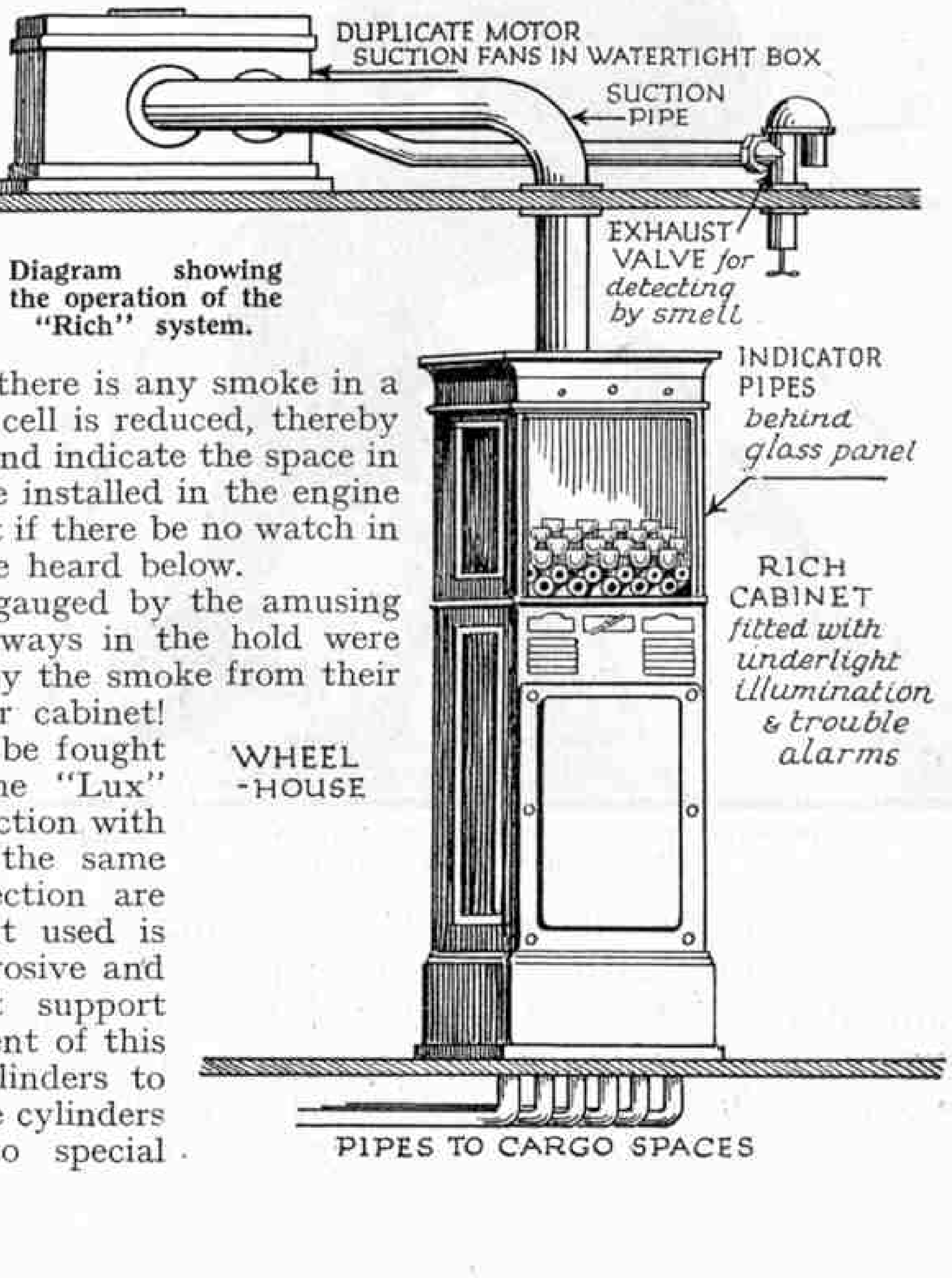


Diagram showing the operation of the "Rich" system.
DUPLICATE MOTOR SUCTION FANS IN WATERTIGHT BOX
SUCTION PIPE
EXHAUST VALVE *for detecting by smell*
INDICATOR PIPES *behind glass panel*
RICH CABINET *fitted with underlight illumination & trouble alarms*
WHEEL-HOUSE
PIPES TO CARGO SPACES

The efficiency of this detector can be gauged by the amusing fact that in one liner a couple of stowaways in the hold were discovered, much to their astonishment, by the smoke from their cigarettes being indicated in the detector cabinet!

Once the fire has been located it may be fought with hose-pipes, but in many ships the "Lux" extinguishing system is installed in conjunction with the "Rich" detecting system, so that the same pipelines that are used for smoke detection are utilised for fire extinguishing. The agent used is carbon dioxide gas, a clean, dry, non-corrosive and non-poisonous substance that will not support combustion and smothers the fire. Sufficient of this gas is stored under pressure in steel cylinders to extinguish any fire in the largest hold. The cylinders are manifolded together and piped to special three-way valves in the smoke-detecting lines.

When a fire has been detected, the appropriate three-way valve is operated, closing the lines to the detecting cabinet and connecting the burning space with the carbon dioxide gas supply. Enough gas is discharged to create an inert atmosphere in the hold. The gas fills the hold from top to bottom and smothers the flames instantly, at any level. Additional gas is discharged periodically to maintain the inert atmosphere until the hot material has cooled.

Another type of fire that spreads very rapidly is an oil fire in the engine room, and the crew are often driven from the burning space before they can extinguish it by normal means. The carbon di-oxide gas of the "Lux Bilge Flooding" system makes it possible to extinguish such fires—no matter how severe and even when flowing oil is involved—from outside the affected area. When released from the battery of cylinders installed outside the engine or boiler room, the gas flows through distributing pipes with nozzle outlets suitably located in the protected space. On leaving the nozzle the gas expands 450 times, and is driven over and around boiler foundations, pipelines and other obstructions. It fills the bilges and the space round the floor plates, and is capable of extinguishing the flames in 10 seconds.

The "Rich" system of smoke detection cannot be used in cabins, as of course a false alarm would be raised every time a passenger lit a cigar, cigarette or pipe! The "Solex" system of fire detection for cabins has been fitted in a number of liners, including the "*Monarch of Bermuda*" and "*President Coolidge*," in addition to the "Rich" system for the holds. In the "Solex" system a quartz bulb is fitted in a mounting in the cabin. If a fire breaks out the rise in temperature breaks the bulb and allows a very strong contact to be made. An electric current then passes to the annunciator cabinet in the wheel-house, rings a bell, and indicates on a small ground-glass screen the number of the cabin in which the fire has occurred. It only requires 10 pairs of leads, running from the annunciator cabinet down through the ship, to connect up over 500 cabins.

As a safeguard, a small trickle current flows continuously through the leads, and if any circuit should be broken a warning is at once passed to the annunciator cabinet, indicating which circuit is out of order and requiring attention.

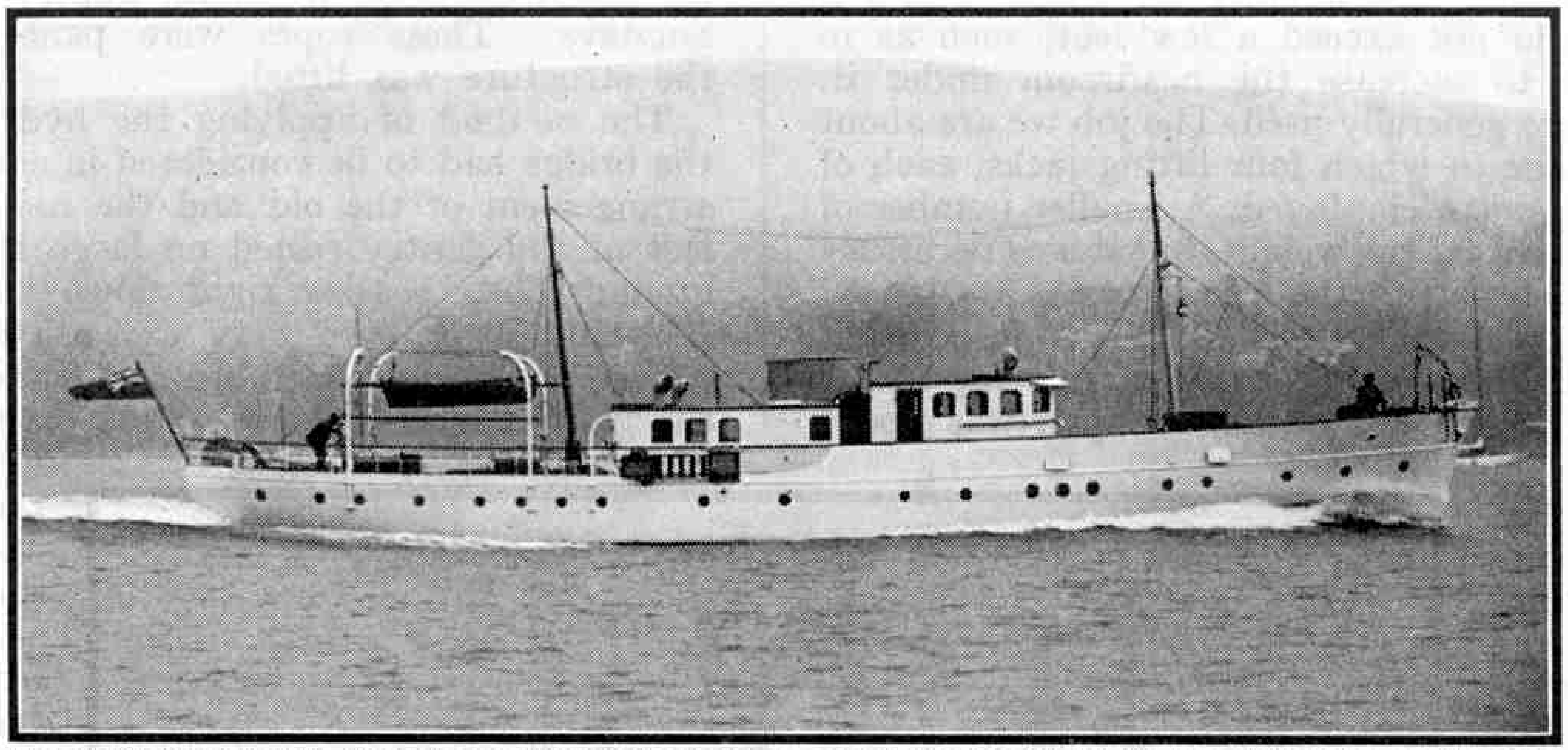
Reference has been made to the use of carbon dioxide gas instead of water for fighting outbreaks of fire in cargo spaces. This gas has the great advantage over water of not wetting, soiling, or in any way damaging the unburned cargo in the hold.

Diesel Propulsion for Pleasure Craft

Two Recent Clyde-Built Yachts

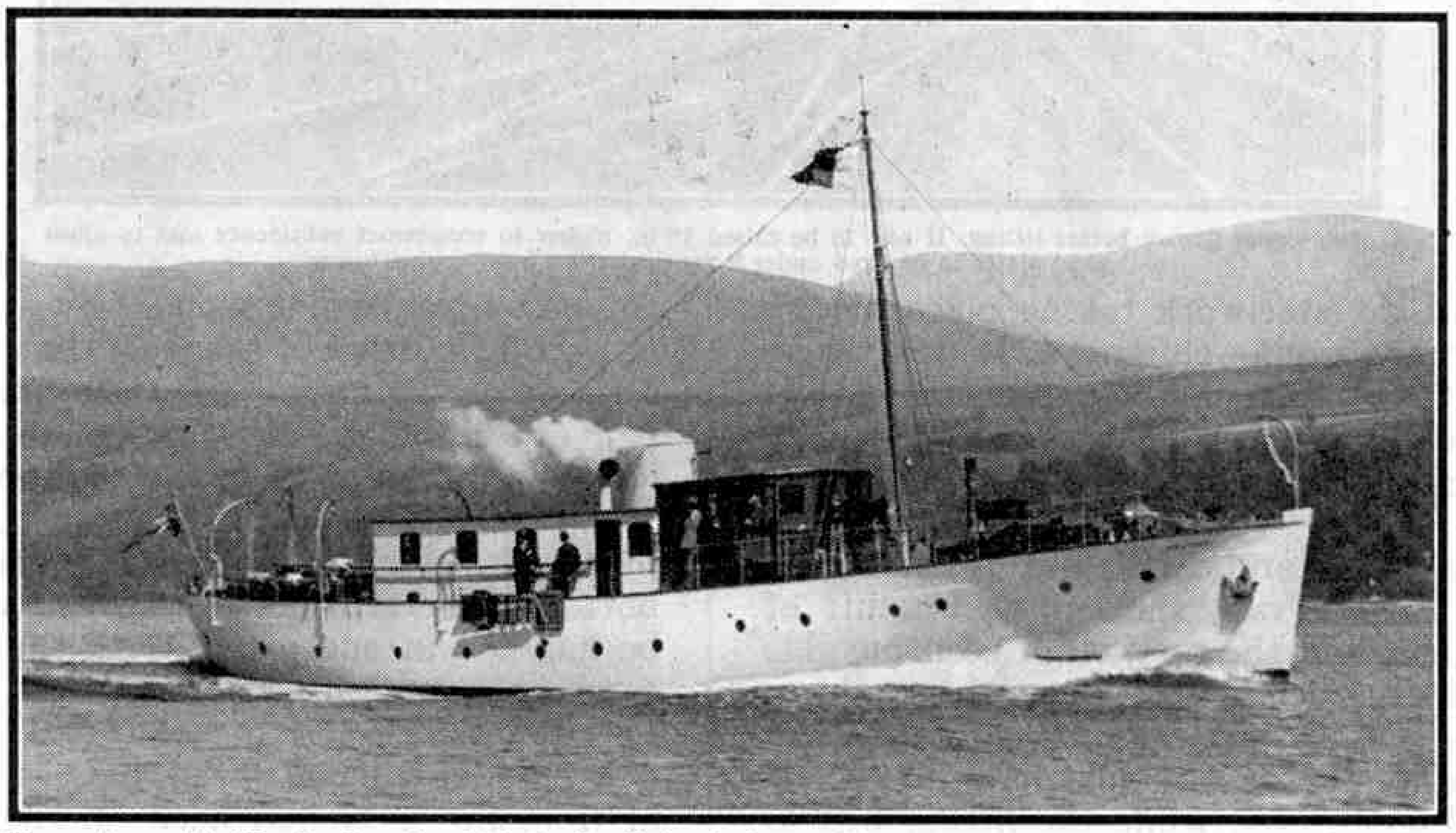
THE recently completed yachts *"Titan"* and *"Destiny,"* illustrated on this page, are interesting examples of the application of Diesel-engined machinery to pleasure craft.

The *"Titan"* is the larger and more powerful of the two yachts. She has an overall length of 98 ft., a breadth of 16 ft., and a depth of 10 ft., and her tonnage is 103. She is propelled by two eight-cylinder M.A.N. Diesel engines, driving through reduction gears. Each engine has cylinders 6.9 in. in diameter with a piston stroke of 8.7 in., and develops 225 h.p. at 900 r.p.m. The cruising speed is 12 knots, but on trials a speed of 13½ knots was reached with the engines overloaded to develop a total output of 500 b.h.p. The 3,000 tons of fuel that can be carried in the main oil fuel tanks is sufficient for a cruise of more than 1,200 miles.



The Diesel-engined yacht "Titan." We are indebted to Yarrow and Company Ltd. for the two photographs on this page.

A striking feature of the *"Titan"* is that complete control of the vessel, and of the propelling machinery and fuel pumps, can be exercised from the wheelhouse. Various indicators and measuring instruments, together with an S.O.S. emergency wireless transmitter, are mounted on the after bulkhead in the wheelhouse. These are illuminated at night by an electric lamp hidden behind a deck beam, and at all times can be seen by the captain or helmsman in a mirror fixed above the central window of the wheelhouse. Another mirror fixed in an inclined position in the fore corner of the wheelhouse reflects the stern of the vessel, so that it is unnecessary to turn round to look aft when manœuvring the vessel. A screen wiper is to be fitted to the front wheelhouse window, and a periscope is to be installed to enable moorings to be seen over the bows when approaching them.



The motor yacht "Destiny" on her trials in the Clyde. On her maiden voyage this vessel crossed the North Sea to Bergen, to cruise in Scandinavian waters.

The general equipment also includes a compass fixed in the ceiling of the owner's stateroom so that when he is in bed he can see if the yacht is being kept to her course, and a speaking tube communicating with the wheelhouse enables him to give directions to the helmsman. The accommodation includes three staterooms situated aft, in addition to a stateroom, dining room and quarters for the captain and crew placed forwards. Throughout the yacht is elaborately fitted.

The *"Destiny"* is remarkable for her unbroken sheer line, an unusual feature in modern practice. She is 86 ft. in length overall, with a breadth of 17 ft. 6 in. and a depth of 10 ft. 9 in. Her tonnage is 104 and her cruising speed is 10 knots. In the engine room are two Gleniffer high-speed Diesel engines, driving through 3 to 1 reduction gears and each developing 120 h.p. at 900 r.p.m. The six cylinders of each engine are 6 in. in diameter and have a piston stroke of 7 in. As a large cruising radius was desired, fuel storage tanks with a capacity of 10½ tons are installed, and a ¼ h.p. motor drives the pumps that deliver oil from them to the gravity tank from which the engines are supplied.

The wheelhouse has windows on all sides and glass panels in the upper part of the starboard door, so that the helmsman has a clear view in all directions. It is equipped with all the necessary navigating appliances, including hand steering gear and a compass that has been specially designed to the owner's requirements. There also is an observation compass fixed to the rear of the starboard sidelight screen.

The deck equipment includes an electrically-driven capstan and an anchor windlass that is coupled to a 4 h.p. motor and can be operated either electrically or by hand. A 14 ft. launch fitted with a 6 h.p. Stuart engine is slung from davits at one side of the rear deck, and an 11 ft. dinghy is slung on the other side.

There are three staterooms, one double and two single, and a saloon containing an open coal fireplace with a flue that conducts the smoke into the funnel. The dining saloon extends the full width of the yacht and seats eight persons, and is warmed by an anthracite stove that supplies hot water to radiators in the various rooms. The galley adjoining the saloon contains an electrically-operated refrigerator and a cooking range that supplies hot water throughout the yacht. The captain's cabin is alongside the galley and the crew's quarters are in the forecastle. The saloon and other rooms in the forepart of the vessel are exceptionally lofty, and this has been made possible by raising the forward portion of the main deck so that it is level with the underside of the bulwark rail.

Both vessels have been designed by G. L. Watson and Company and built under their supervision by Yarrow and Company Ltd., to whom we are indebted for our information.

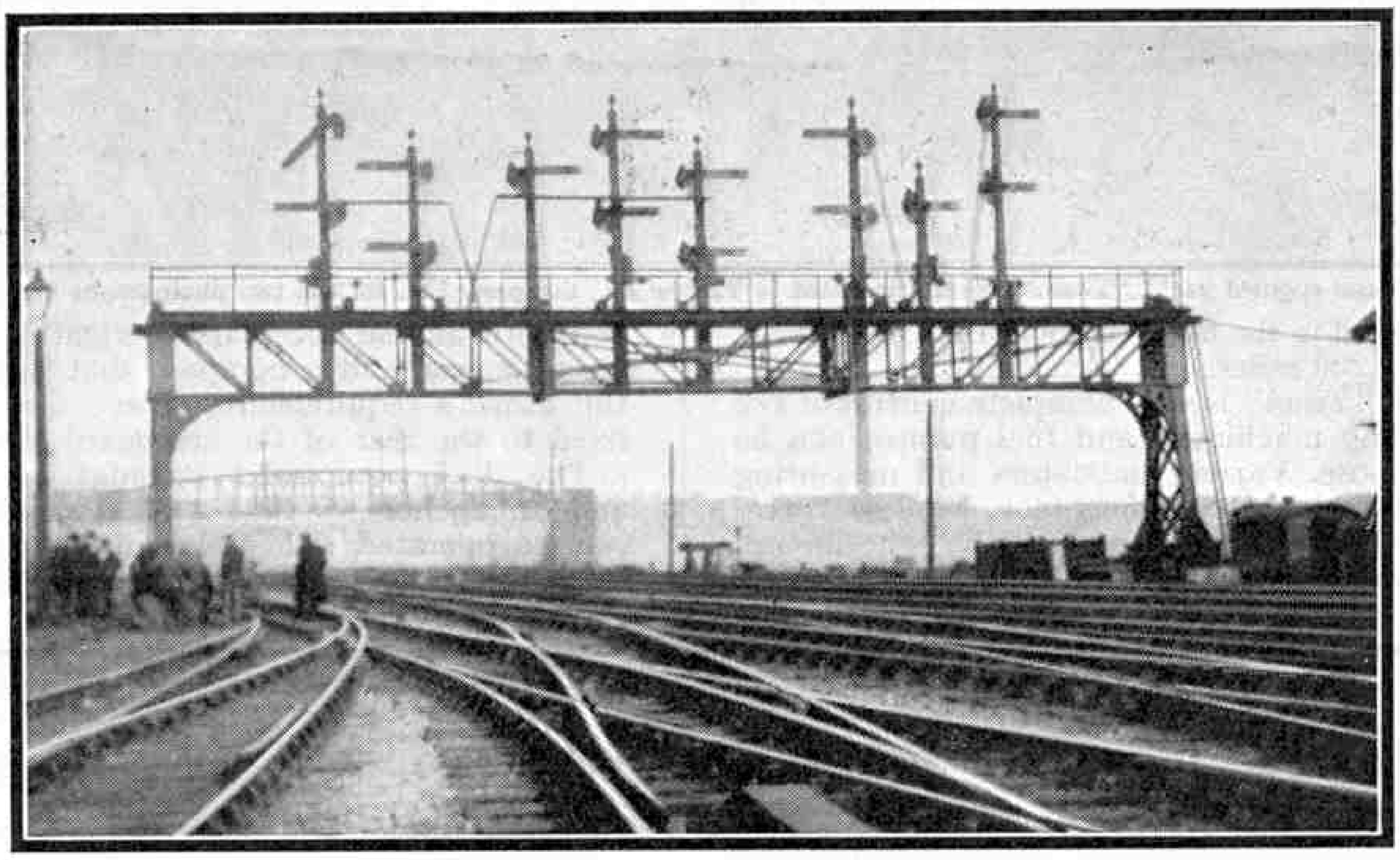
Raising a Signal Gantry

How an Unusual Lifting Job was Carried Out

By R. D. Gauld, M.Eng., A.M.Inst.C.E.

THE lifting of considerable weights is an important part of engineering work, and when a height of many feet is involved it is usually necessary to employ cranes or derrick poles. Where the weights are large, but the amounts of lift do not exceed a few feet, such as in raising a bridge to increase the headroom under it, hydraulic jacks are generally used. The job we are about to describe was one in which four lifting jacks, each of 20 tons' capacity, were employed. A smaller number of jacks would have raised the weight, but it was necessary to have four on account of the nature of the work.

There was a signal gantry with 14 arms on it, eight reading in one direction, six in the other. Owing to the gantry spanning across six tracks, its span was about 74 ft. and its weight complete with signals was estimated to be about 35 tons. Subsidence of the district due to mining operations underneath had led to such structures as bridges gradually sinking, while the line had constantly to be raised to keep it drained. As a result, the headroom under the gantry had become reduced to the safe minimum. In addition, the constant passage of engines underneath had been the cause of corrosion of the steelwork taking place by the harmful fumes from the engine chimneys. It was therefore decided to lift the gantry such a distance that steel plates could be fixed under it, and over each line, to resist the blast action, still leaving the standard clearance beneath.



The signal gantry before lifting. It had to be raised 18 in. higher to counteract subsidence and to allow steel plates to be fixed under it for protection from engine fumes.

Levels taken of each rail, and each point of the underside of the gantry over a rail, showed that a lift of 1 ft. 6 in. was required; and the method of securing this had then to be considered. The great essential in railway engineering operations is to cause as little interference as possible with traffic. It was obvious that the signals would have to be disconnected while the lifting was in progress, and therefore it would be necessary to do the work on a Sunday when only a few trains would be passing. It was decided that traffic could be allowed to pass under the gantry during the work, the actual jacking being stopped while a train was underneath the structure.

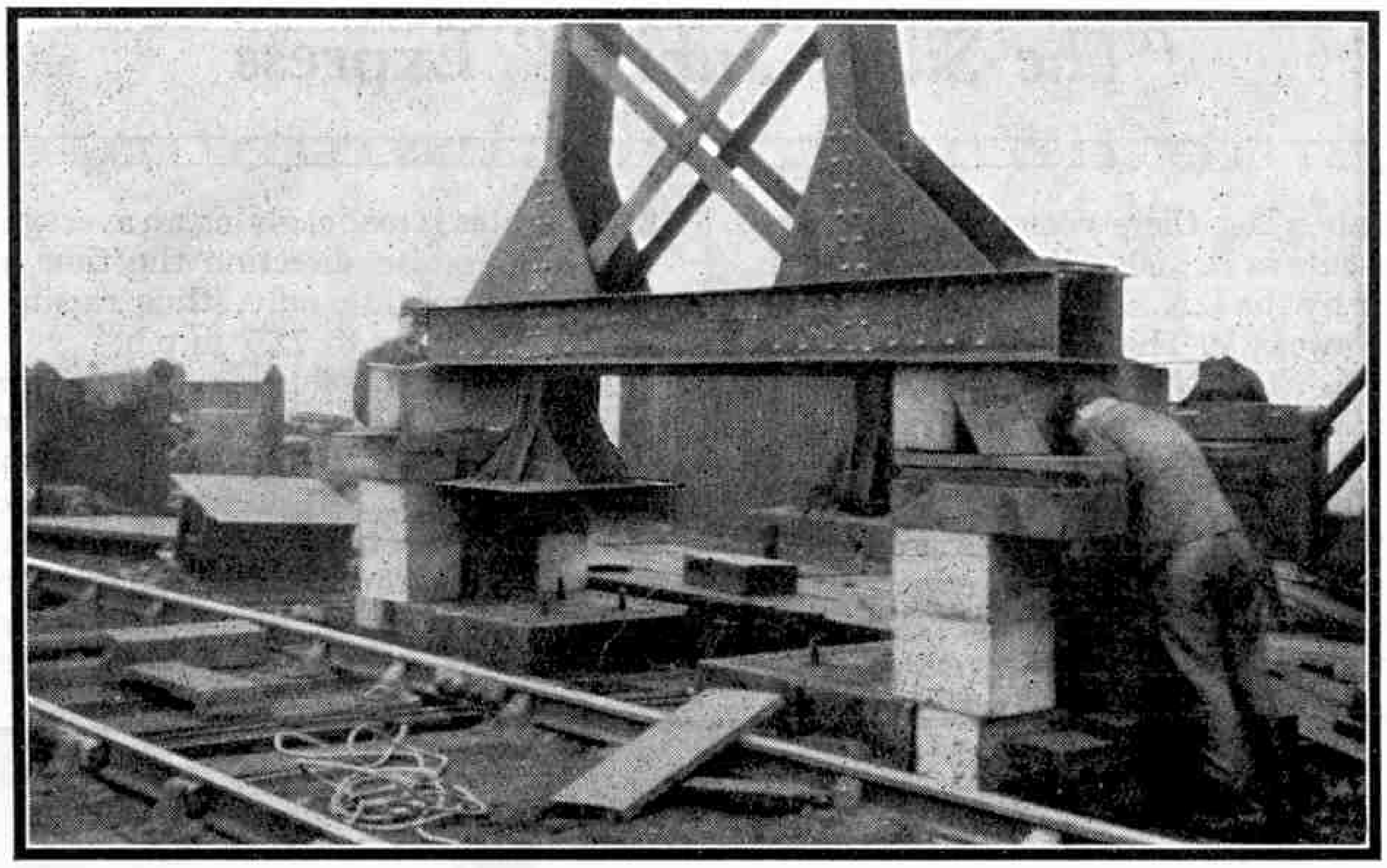
It would have been inadvisable to do a job of this kind in a high wind, owing to the danger of overturning, but fortunately the day chosen proved to be calm. As a precaution, however, ropes were fastened at each end of the gantry, and taken on to the rails underneath, the track nearest each end of the gantry not being used on Sundays. These ropes were paid out gradually as the structure was lifted.

The method of applying the hydraulic jacks to lift the bridge had to be considered in conjunction with the arrangement of the old and the new foundations. The feet of the gantry rested on large stone blocks in the ground, bolts passing right down through the stones. It would have been very expensive to disturb these stones, and also undesirable, as they were well settled in the ground and could be relied on to carry the load. Every effort therefore had to be made to use the same foundations again. This was done by making up an arrangement of steel joists and plates, to rest on the old foundations, and allowing the raised feet of the gantry to be fixed to them.

One of the standard structural steel joists used in this country is exactly 18 in. deep, but three of these side by side under each foot would have been awkward for the bolt holes, which would have come so near the web or upright portion of the joist that the nuts could not be screwed on. So two of the 18-in. joists were used, with a pair of 9-in. joists, on top of one another, between. The latter are not so wide in the head, or flange, so that they allowed the bolt holes to come clear. Each small group of joists was assembled with a ½ in. plate riveted on top and bottom, to form what we may call a "stool," which could be handled in one piece. With the plates on, the stools gave an actual lift of 19 in., but the extra inch was an advantage.

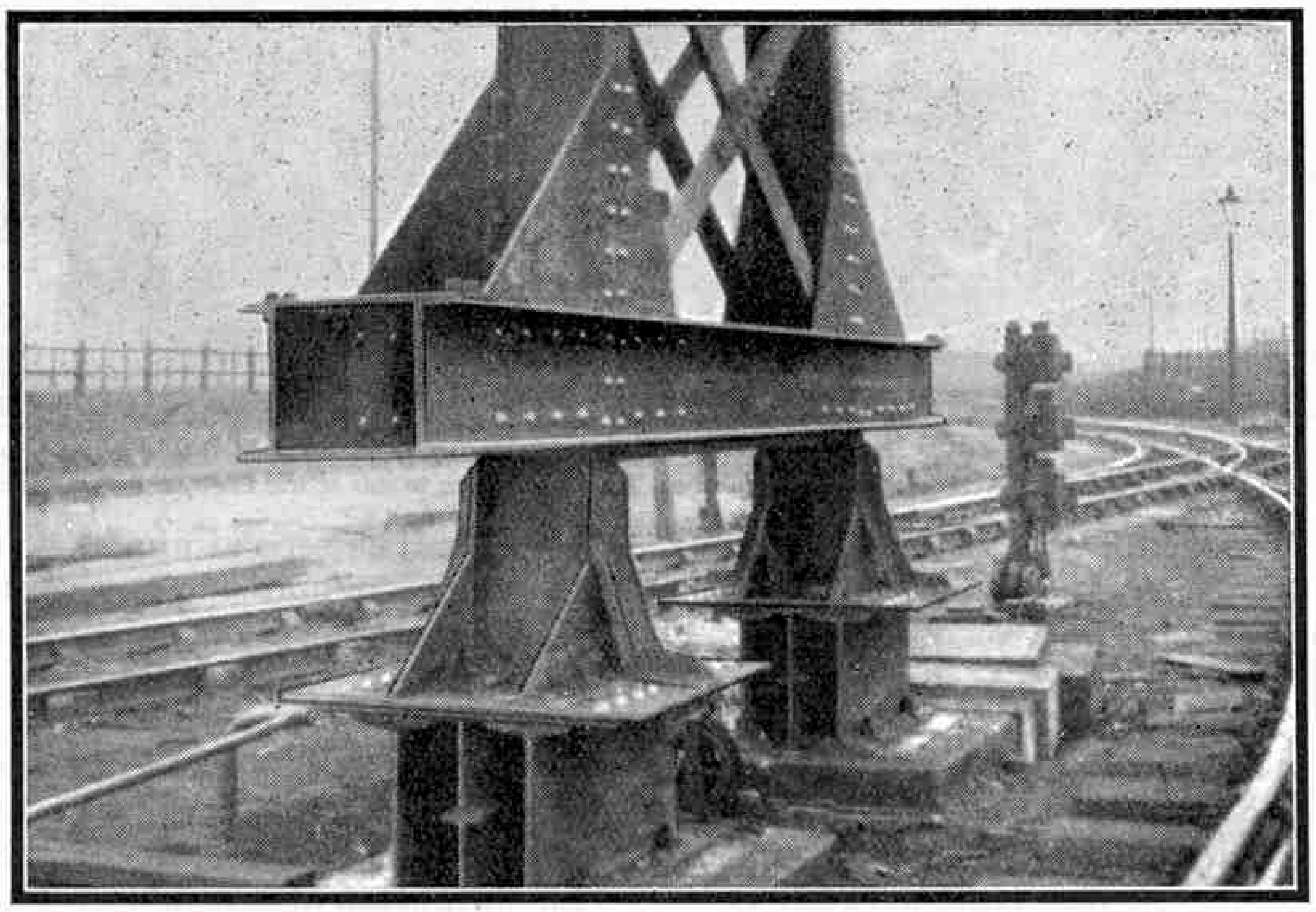
A possible difficulty was that, on account of the length of time the nuts had been on the holding-down bolts, they might be rusted solid. Lumps of cotton waste soaked in paraffin oil were therefore put round each nut a few days beforehand, and by this means the nuts were all loosened, and all except one screwed off easily. This odd one was cut off by hammer and chisel.

The next point for decision was how to get the lifting jacks under the job. The photographs show fairly clearly what was done. A pair of what are called "channel irons," but are actually made of mild steel, like the joists, were fixed to each leg of the gantry, triangular-shaped mild steel plates, ½ in. thick, being used to secure them to the uprights. The lengths of the channel irons were so chosen that the jacks could stand clear of the foundations while pushing under the ends of the channels. A small steel plate connected each pair of channels at each end and formed a bearing against which the jacks could work.



Jacking up the gantry clear of its foundations. The jacks were applied at the ends of channel irons fixed to the legs of the gantry and were arranged to be supported on prepared timbers.

The built-up stools were made, and the lifting arrangements fixed to the gantry, before the Sunday on which the lifting was done. One or two minor obstructions, such as boarding, were also removed. At 8.0 a.m. on the Sunday selected for the work, the man who was to give the hand signals while the ordinary signals were out of action took up his position. The signal fitters then disconnected all the signals at a convenient place between the signal gantry and the cabin. At 9.0 a.m. the eight men and foreman who carried out the lifting work commenced by getting the four jacks in position on a prepared timber foundation. One side of the gantry was then gently raised about 3 in., and the space so created packed up with timber. The opposite side was then treated similarly. Then the first side was lifted again, a very slight further lift just clearing the bolts. It was anticipated that the bolts might spring one way or another when the base plates cleared them, but actually they hardly moved. Lifting proceeded more rapidly then, the guy ropes of course being paid out as required, to allow the gantry to rise. Pitch pine blocks, 12 in. by 12 in., were chiefly used to make up the height as the jacking proceeded.



The signal gantry lifted on to stools and fixed to them. The stools were formed by riveting plates on groups of two 18-in. and one 9-in. steel joists.

By 9.45 a.m. both sides were clear of the holding-down bolts, and at 11.5 a.m. both sides were high enough to allow the stools to be slipped in over the bolts. These bolts stuck out 5 in. above the foundation stones. Holes to accommodate them had previously been carefully marked off on the stools and drilled. As soon as the stools had been slipped over the bolts, the nuts were screwed down, and the gantry was lowered again so that the feet were resting on top of the stools. By 12.50 p.m. it was possible to start drilling holes down through the feet of the gantry and the tops of the stools, so that bolts could be put in. When all was bolted down securely, the bolts were taken out one by one and rivets put in their places.

Meanwhile, after the gantry had reached its final level, the signal fitters pieced up the various wires again, so that by 3 p.m. all the signals were once more working from the cabin, and the job was complete for the day.

During the following week-days the lifting attachments were removed from the gantry supports. To make up for the reduced strength due to the holes that had been drilled in the supports, mild steel plates, 6 in. by ¾ in., were riveted on to them. Concrete bases were cast round the steel stools with two objects in view. One was to protect the stools from corrosion, and at the same time save the cost of painting. The other was to give the supports of the structure greater security against possible damage by derailed vehicles. The track adjoining each support of the gantry is much used for shunting, and a wagon jumping off the line and striking the support might cause a bad collapse. The concrete is taken to such a height that it would receive the shock of any such mishap.

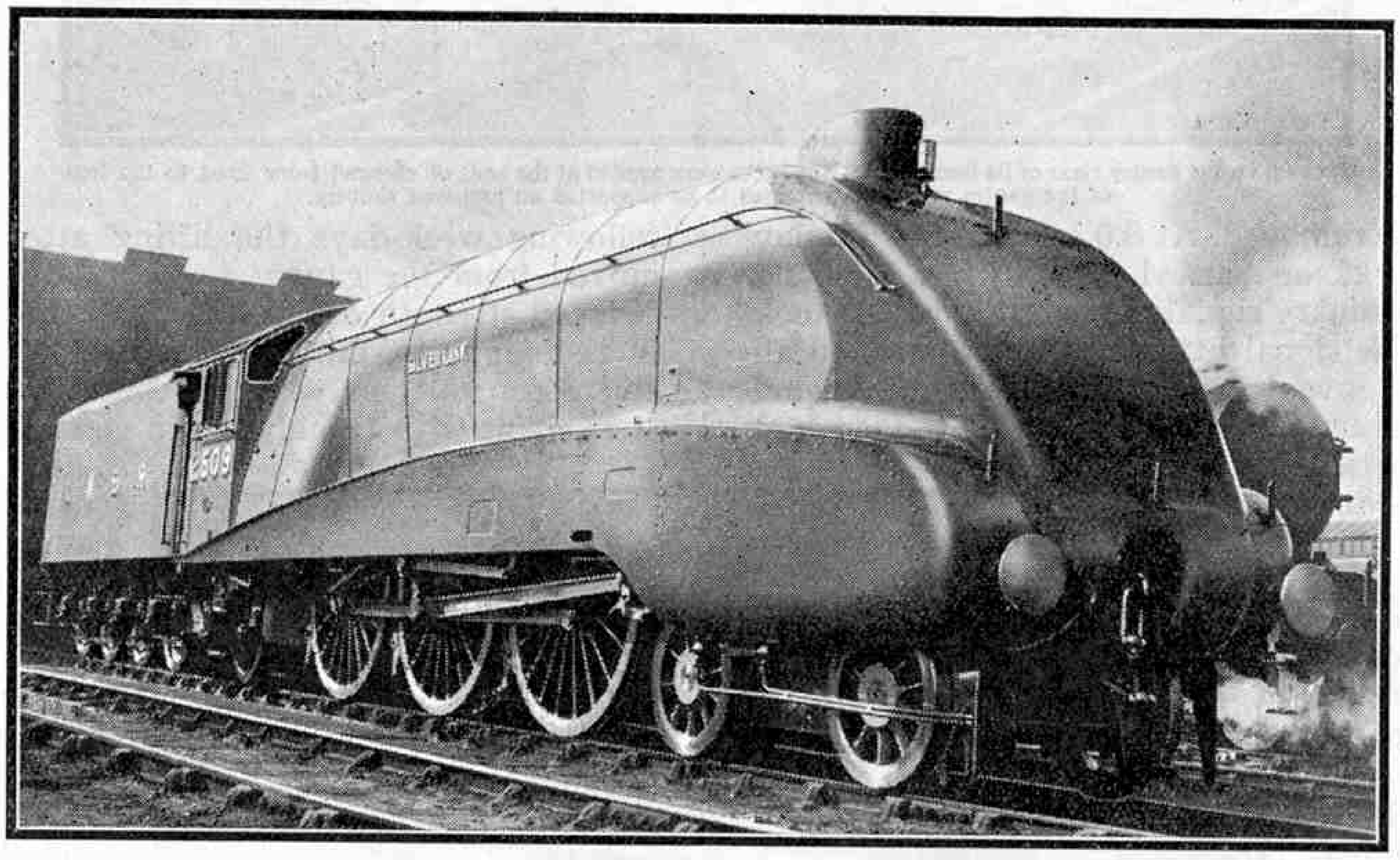
The temporary lifting attachments worked well, but were expensive. It should be remembered, however, that structures such as this signal gantry are themselves expensive. It is not only a matter of the actual weight of steelwork in it, but the difficulty of erecting the gantry in such a position owing to the demands of traffic also has to be considered. It was worth while spending a good deal of money to prevent further corrosion of the structure, as a renewal, which would have been inevitable in a few years, would have cost several times as much. The fitting of the smokeplates under the gantry girders, made possible by the increased headroom, should prolong the life of the structure by many years.

Britain's First Streamlined Train

"The Silver Jubilee" Express

ON the 30th September last there occurred one of the most interesting events in British railway history. This was the commencement by the L.N.E.R. of a 4-hour service between London and Newcastle. This was carried out by a new express named *"The Silver Jubilee"* in honour of the 25 years' reign of His Majesty King George. This special train is of streamlined form and special locomotives, also streamlined, are provided for its haulage.

Although extremely high maximum speeds are not required by the new schedule, some startling experimental running had been carried out, especially on Friday, 27th September, on the occasion of the 110th Anniversary of the opening of the Stockton and Darlington Railway, of which pioneer line the L.N.E.R. is a direct and worthy descendent. In the course of a special journey, forming the final trials of the streamlined locomotive No. 2509 *"Silver Link"* and its train, a maximum speed of 112 m.p.h. was reached, thus beating the previous British record of 108 m.p.h. that was made by the "Super-Pacific" No. 2750 *"Papyrus"* on 8th March last. The enginemen on this occasion were Driver Taylor and Fireman Luty of King's Cross, who made the fine run on the 1.20 p.m. *"Scotsman"* that was described in the May issue.



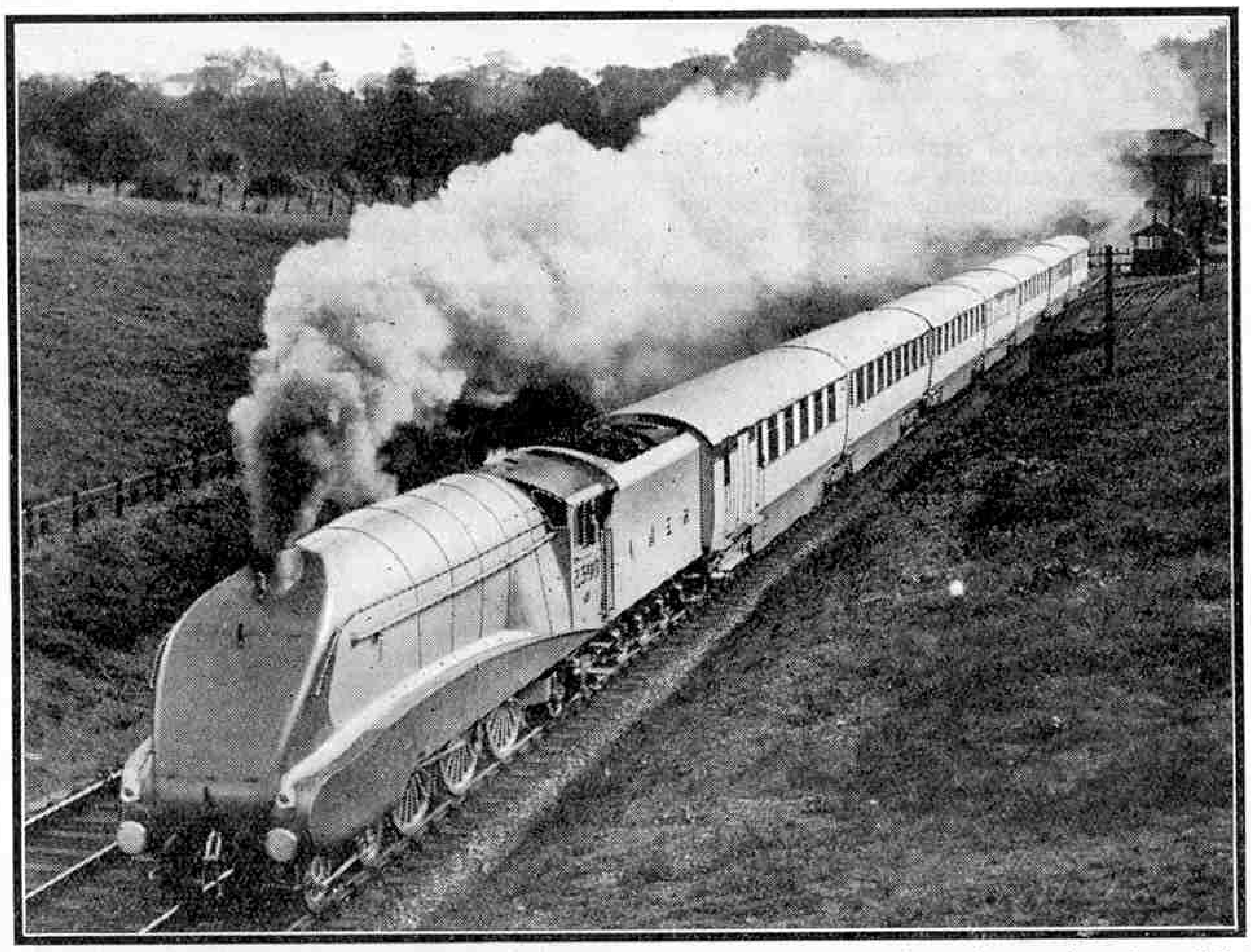
L.N.E.R. No. 2509 "Silver Link," the first of the new streamlined "Pacifics" for "The Silver Jubilee" services, showing the formation of the front end and the generally striking appearance. The illustrations to this article are by courtesy of the L.N.E.R.

"The Silver Jubilee" leaves Newcastle Central at 10 o'clock each morning, except Saturdays and Sundays, and after a journey of 268 miles, with an intermediate stop of two minutes at Darlington, it reaches King's Cross at 2 p.m. The return journey is made from King's Cross at 5.30 p.m. and with a stop at Darlington, as before, Newcastle is reached at 9.30 p.m. The overall average speed is 67.07 m.p.h., the average south of Darlington being 70.3 m.p.h. These speeds apply in each direction, and are the fastest in the British Isles for distances over 200 miles, making *"The Silver Jubilee"* the fastest long-distance train in the world. A feature of the schedules is the high uphill speeds required, and it is not anticipated that it will be necessary to run at extremely high speeds downhill. Thus over the 29 miles between Peterborough and Grantham, which include the long rising gradients of 9 miles to Stoke Summit, ranging from 1 in 200 to 1 in 178, an allowance of 24½ minutes is made, giving an average speed of 71.3 m.p.h. In the opposite direction the time allowance is reduced by half a minute only, thus raising the average speed over the section to 72.7 m.p.h.

Apart from its schedule, *"The Silver Jubilee"* is notable as striking a new note in British express train design. It occasions no surprise that it is composed of articulated units, for the L.N.E.R. have long used this form of construction as a standard feature; but the continuous streamlined form of the train, together with its aluminium and steel finish, make it quite unlike any other train in this country. The form of streamlining adopted is the result of prolonged investigation, the problem having been tackled with three ends in view by Mr. Gresley, Chief Mechanical Engineer of the L.N.E.R. The first aim was to reduce the head-end resistance in the interests of fuel economy, for the power required to overcome air resistance on the front of the engine at 70 m.p.h. is approximately 50 per cent. greater than at 60 m.p.h. The second aim was to ensure the lifting of the exhaust steam and smoke well clear of the cab, in order to avoid interference with the driver's vision; and the third was to reduce the disturbance of the atmosphere alongside the train. It was therefore decided to adopt a horizontal wedge formation of the front end, as this would cause an upward current of air to sweep past the chimney, and by its velocity assist the steam and smoke to clear the cab. This formation also would avoid any lateral disturbance of the atmosphere. For the same reason the usually straight footplate has been given a streamlined form.

The result is that the engine presents to the air practically a continuous surface, without any "pockets," for the streamlined casing rising from the front buffer beam covers the front of the smoke-box and its door. Actually the chimney is mounted on the sloping smoke-box top, and the slope is continued behind the chimney. This, with the tapering formation of the front part of the boiler casing, allows the air to pass the chimney in its upward rush and get under the exhaust as it leaves the chimney, thus lifting it up clear of the cab. Access to the smoke-box is given by the opening of the front cover plate, which is hinged and divided into two parts. The cylinders are sheathed in a metal casing suspended from the curved footplate, and the motion is partly concealed also. Inspection doors are provided to give access to the different parts of the valve gear.

In spite of this striking external treatment, for which the appearance of *"No. 10000"* and *"Cock o' the North"* have somewhat prepared railway enthusiasts, the engine itself is similar to the standard "Super-Pacific" design, incorporating three - cylinder propulsion. The boiler pressure has been increased from 220 lb. to 250 lb. per sq. in., however, and the boiler differs in having a combustion chamber. The steam supply is taken through a series of slots in the top of the boiler into a steam collector, which is a steel pressing, integral with the dome, as on the more recent "Super-Pacifics" and the "Mikados." The cylinders are 18½ in. in diameter, a reduction from the "Super-Pacific" dimension of 19 in. The tractive effort figure stands at 35,455 lb., however, as compared with the 32,909 lb. of the "Super-Pacifics."



"The Silver Jubilee" express hauled by No. 2509 "Silver Link." This photograph shows the smooth contour of the train as a whole, and the satisfactory smoke deflection also is clearly apparent.

Special care has been taken to make the exhaust passages as smooth as possible, and a "jumper" ring is fitted to the blast pipe nozzle, as in G.W.R. and recent L.M.S.R. practice. This ensures a free exhaust at long cut-offs and prevents undue disturbance of the fire when working hard.

The wide fire-box is arranged with a grate area of 41¼ sq. ft. Part of the grate is arranged to drop, and the ashpan, designed to give a free air flow under the outer side fire-bars, is of welded construction.

The front of the cab is V-shaped, giving an exceptionally wide angle of vision for the crew. Bucket seats are provided in the cab, and flexible rubber roofing is fitted over the gap between the engine and the tender, to eliminate back draught. A pyrometer, giving the superheat temperature, has been provided, and also a speedometer; and these, in addition to the usual cab fittings, afford a complete index of the working of the engine. A chime whistle, as on *"Cock o' the North,"* is fitted in front of the chimney, and is operated by means of a Bowden wire control.

Principal dimensions of the L.N.E.R. streamlined 4-6-2 locomotive No. 2509 "Silver Link."

Cylinders (3) Diameter	**18½ in.**
Stroke	**26 in.**
Driving Wheel Diameter	**6 ft. 8 in.**
Heating Surface	
Fire-box	**231.2 sq. ft.**
Tubes	**1,281.4 sq. ft.**
Flues	**1,063.7 sq. ft.**
Total evaporative heating surface	**2,576.3 sq. ft.**
Superheater elements	**749.9 sq. ft.**
Combined heating surface	**3,326.2 sq. ft.**
Grate Area	**41.26 sq. ft.**
Working pressure	**250 lb. per sq. in.**
Tractive effort at 85 per cent. working pressure	**35,455 lb.**
Coal capacity of tender	**8 tons**
Water capacity of tender	**5,000 gallons**
Total weight of engine and tender in working order	**165 tons 7 cwt.**
Total length of engine and tender over buffers	**70 ft. 3½ in.**

The motion generally is of the same type as that provided for the previous "Pacific" engines. Walschaerts valve gear is employed for the two outside cylinders, and the Gresley patent derived motion transmits the movement to the valve of the inside cylinder.

The tender is of the standard eight-wheeled corridor type with Pullman-type gangway and "Buck-eye" coupler. It is rounded at the back to conform with the coaches of the train. The coal capacity is 8 tons, and the tanks hold 5,000 gallons of water. Water pick-up apparatus is provided.

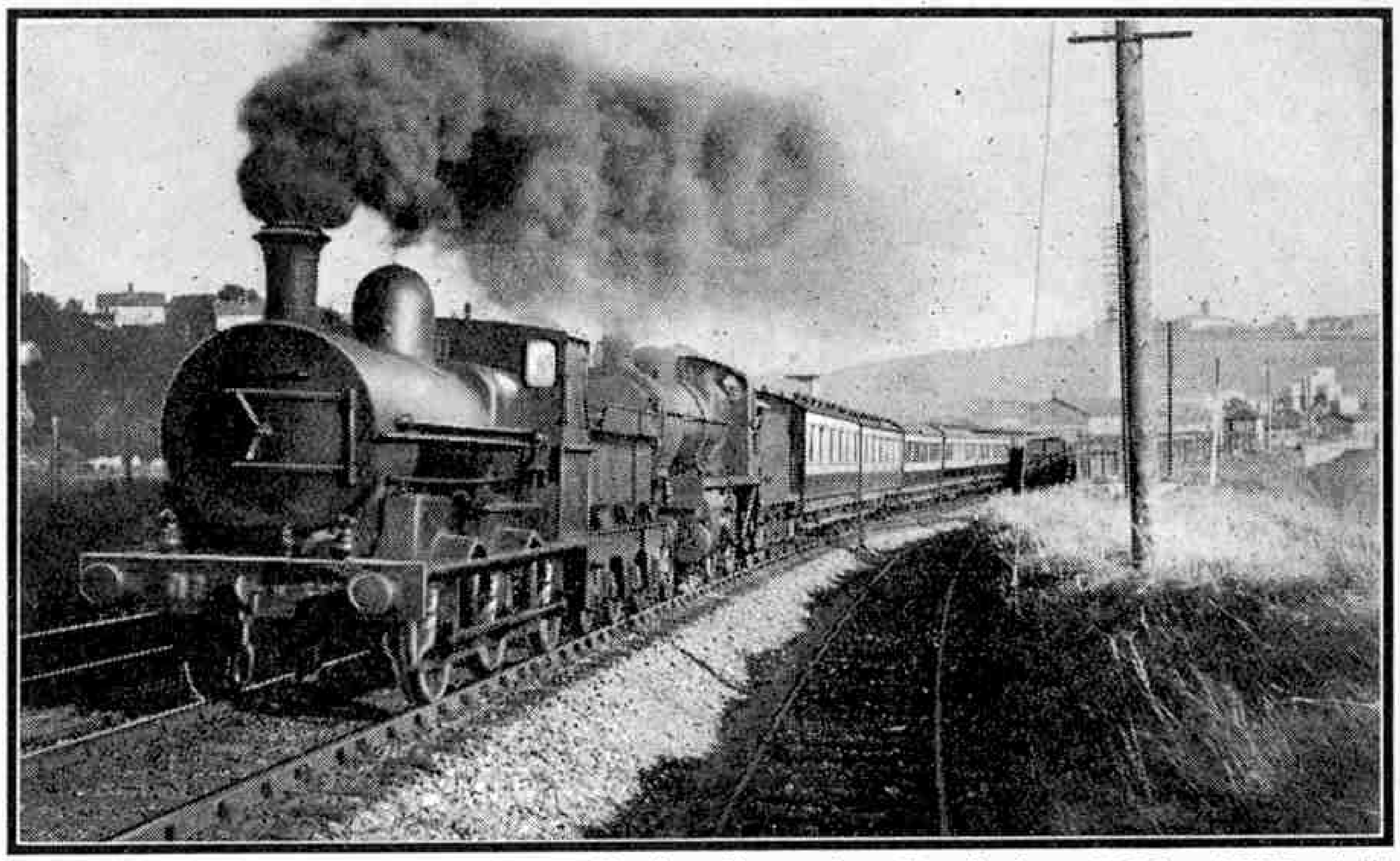
The train is made up of seven vehicles, the central kitchen and restaurant cars forming a triple articulated unit, with a two-coach articulated unit, first-class and third-class respectively, at each end. The total seating capacity is for 198 persons, and the tare weight of the train is 220 tons. The body framing is of teak, with external steel panels, the floor being bolted direct to the underframes, which are rigidly trussed, and electrically welded together. They are mounted on standard L.N.E.R. four-wheeled bogies of the compound bolster type. Floors, roofs and walls have been specially insulated against noise, and the large side windows are fitted with double glass having an air space of ¼ in. between them, in order to reduce as far as possible the transmission of external heat and sound. Projections on the outside of the coaches have been kept down to a minimum, and in order to reduce the air resistance a skirting is fitted between the bogies, extending downward from the body to within 10¼ in. of the rails. In order to preserve the continuous outline of the train the space between the vehicles is closed by special rubber sheeting.

The external finish of the train is quite a new departure. Aluminium Rexine is applied to the steel panels, and the door and window facias and beadings are of stainless steel. Internal decoration is carried out on new and modern lines, the aim of the design being to give an air of spaciousness. Rexine is largely made use of for wall and ceiling decoration, and chromium-plated fittings are a feature. Special care has been taken in arranging the lighting, and the whole train, except the kitchen car, is fitted with automatic air-conditioning and heating apparatus. Fresh filtered air is forced into the compartments through inlets near the floor, and in cold weather the air is heated to the required temperature, controlled by a special thermostat.

The Great Southern Railways (Ireland)

Features of General Interest

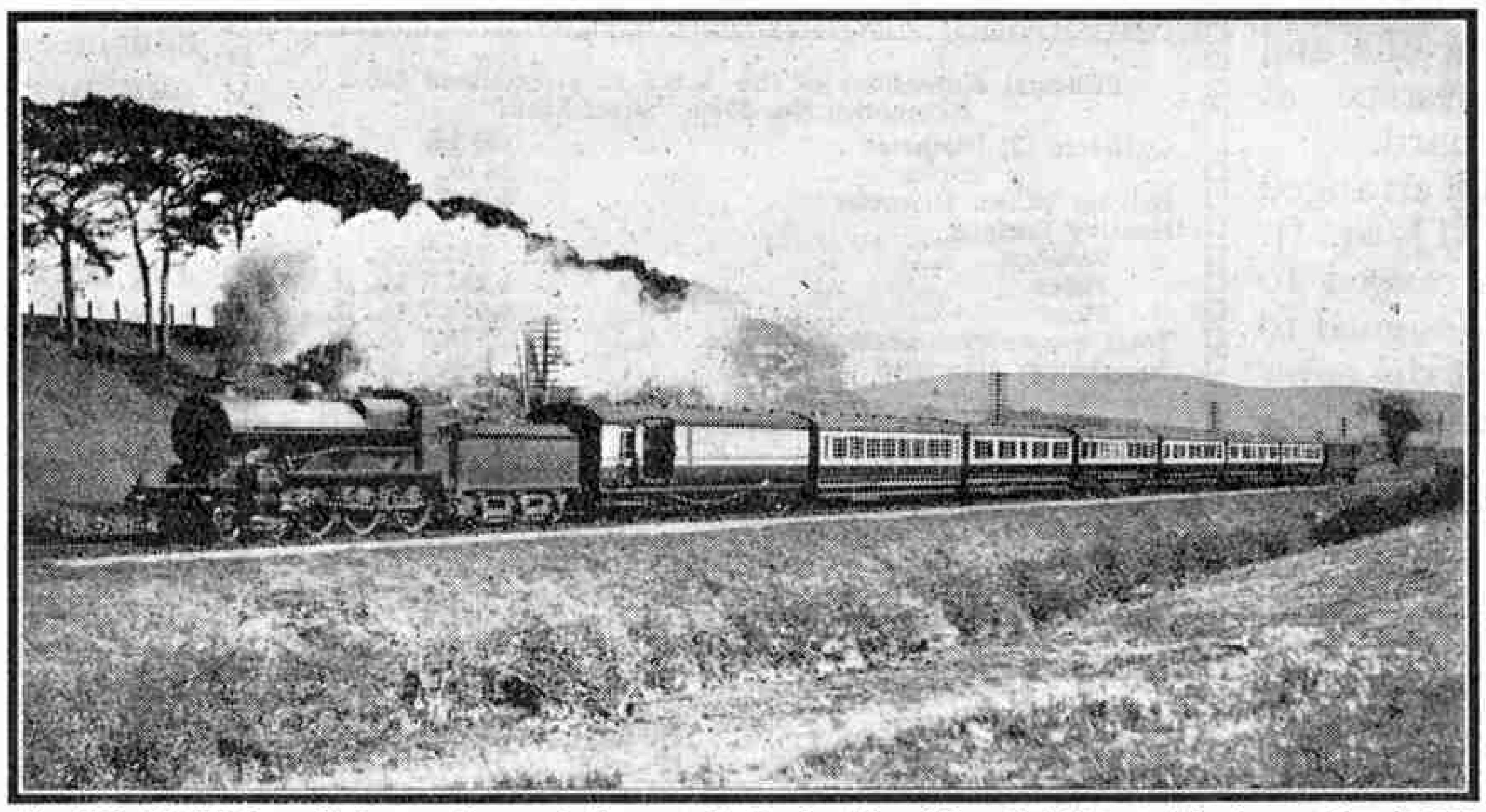
THE present Great Southern Railways System of Ireland was formed as a result of the amalgamation in 1925 of several previously independent Irish Railways. Of these the largest and most important was the Great Southern and Western Railway, which was incorporated in 1844 as a line from Dublin to Cashel and Cork. The original scheme was not followed up, however, the line being made via Thurles and Limerick Junction. As a result of its subsequent expansion it became the largest railway system in the country.



A Rosslare Boat Train headed by a curious combination of locomotives. The pilot is an old G.S. and W.R. rebuilt goods engine, and the other is one of the "Moguls" of S.E. and C.R. design adapted to the Irish gauge. The photographs on this page are by R. Murphy, Cork.

With it, since 1925, has been associated the former Midland Great Western Railway, which was incorporated in 1845 to run from Dublin to Mullingar, and subsequently to Athlone and Galway. Another constituent was the Cork, Bandon and South Coast Railway, also incorporated in 1845; and the Dublin and South Eastern Railway, which had only borne this title since 1907, having been previously known as the Dublin, Wicklow and Wexford Railway. It was originally incorporated in 1846 under the ponderous title of the Waterford, Wexford, Wicklow and Dublin Company. The title of the present group system is an indication of the area served.

The Great Southern, therefore, is an important line linking the Free State capital with Cork, Cobh (Queenstown), Waterford and Rosslare, stretching into the South West, and reaching across to Clifden, Achil and Sligo on the West Coast. Through services are operated between Cobh, Cork and Dun Laoghaire (Kingstown) Pier, in connection with L.M.S.R. sailings to and from the last-mentioned place. It is in connection with these that the crack trains of the system, the "*Limited Mails*," are run, and very complete arrangements exist at Dun Laoghaire for dealing with passenger and mail traffic.

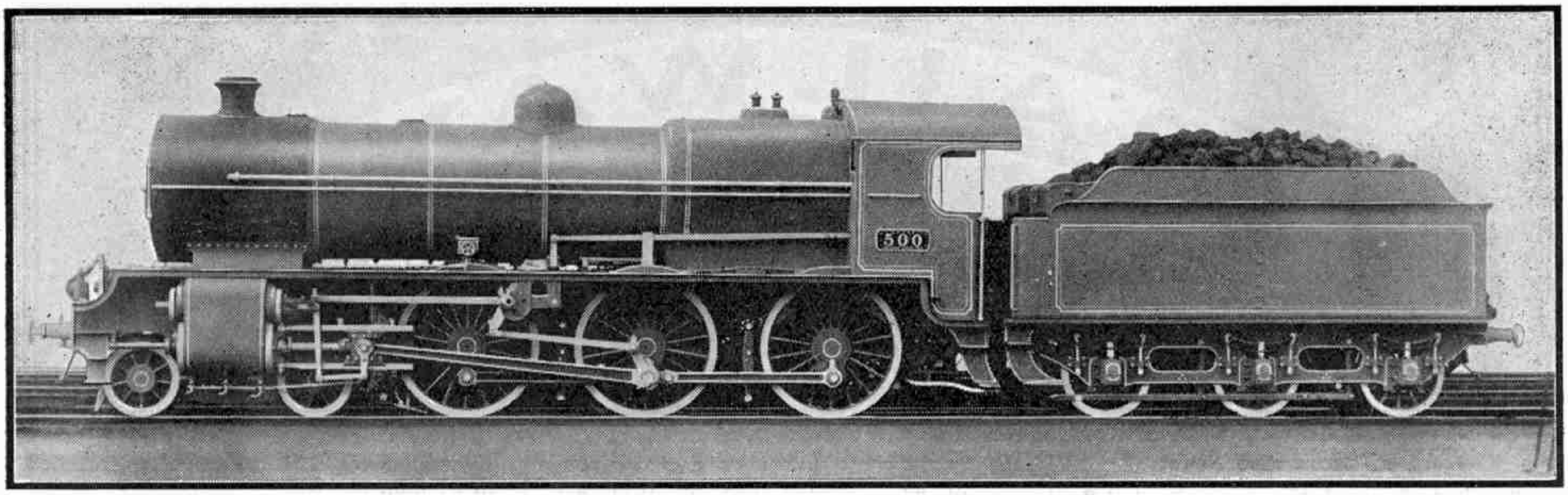


The "Up Mail" from Cork near the quaintly-named signal cabin of Two Pot House. The locomotive is one of the 4–6–0 express engines, originally with four cylinders, but now rebuilt with two cylinders and poppet valves, and provided with a large tender holding 4,500 gallons of water and 8 tons of coal.

Over the principal main line of the Great Southern Railways, that of the former G.S. and W.R. from Dublin to Cork, the road is well graded, except at the ends of the run. It is generally in favour of up trains so that the best schedules are in the up direction. From Kingsbridge terminus in Dublin there is a climb past Inchicore to Clondalkin, after which the line undulates with a gradual rising tendency to the Curragh. After an intermediate dip, the line falls away from Kildare, and the next really pronounced peak in the gradient profile occurs near Ballybrophy. The next rise of any consequence occurs after Limerick Junction, and finally there is a short climb to the 140½ mile post. Thence the line falls down to Mallow. Descending further to Mallow Viaduct it climbs out of the Blackwater Valley again and then falls the whole of the way to Cork, very steeply so from a point just beyond Rathpeacon. The start from Cork, for Dublin-bound trains is therefore difficult. After negotiating Cork Tunnel, the longest on the system, which is on a gradient partly at 1 in 78 and partly at 1 in 64, the line eases to 1 in 74. Then comes an abrupt rise at 1 in 60 that continues for nearly two miles. Pilot assistance is therefore provided for trains of any great weight, sometimes as far as Mallow. As the pilot employed may be any engine that happens to be handy, some curious locomotive combinations are to be seen. In the early days pilots were used also up to Inchicore from Kingsbridge at the Dublin end. Up trains used to detach their engines at this point and run forward to Kingsbridge by gravity.

With regard to the operation of traffic, no account would be complete without some reference to the station at Limerick Junction, where the line from Limerick to Waterford crosses the main line, for Limerick Junction is nowhere near Limerick itself! Although the main line is double, this station has only a single platform on a separate track at one side of the line. Trains in either the up or the down direction requiring to reach the platform from their own line have to cross over and then back into their platform, as the crossover connections are in the middle of the platform length, and in a trailing direction to the running lines. Thus when up and down trains are in at once the engines face each other over the crossovers, "like a pair of cats," as it has been said. Having discharged their station duties up trains then start away and cross from the station line on to their correct track, but down trains have to cross the up main line in addition to regain their track.

Smart locomotive work is required if time is to be kept with the "*Limited Mails.*" These trains have always had a special reputation and this tradition is well maintained in their operation generally to-day. The principal locomotives on the Dublin and Cork main line of the Great Southern system are the large superheated 4–6–0 engines first introduced as a 4-cylinder type by the former Great



Southern and Western Railway. The first locomotive, No. 400, was evidently based on the G.W.R. 4-cylinder design, and appeared in 1915. Two of the class, Nos. 401 and 406, have been converted within the last few years to the two-cylinder arrangement with poppet valves and gear in place of the four cylinders with piston valves and outside Walschaerts motion of the original design. As showing the speed capabilities of the "400" class, a run made by No. 402, a two-cylinder engine, may be mentioned. With a special of three coaches, the 165½ miles from Cork to Dublin were covered at an average speed of 67½ m.p.h. on one occasion last year.

Important work, including even "Mail" duties, is performed by the mixed traffic locomotive of the "500" series, which are two-cylinder 4–6–0 locomotives introduced in 1924. All these 4–6–0 engines have big tenders that have a large coal capacity, and as water troughs are not used, the tanks hold a generous quantity of water. The 4–6–0 type of locomotive was introduced into Ireland in 1905 by the G.S. and W.R., but the engines concerned were not for express working but for freight traffic. In addition to some true "Mogul" or 2–6–0 engines with outside cylinders, to which we shall refer shortly, there are some of that curious 2–6–0 type with inside cylinders. Some of these were built for the G.S. and W.R. as 0–6–0 engines in 1903, but subsequently were converted to 2–6–0s between 1906 and 1908. A further lot were built new as 2–6–0s in 1909. This 2–6–0 type of engine was also represented on the D. and S.E.R., their engines being built in England in 1922 by Beyer, Peacock and Co. Ltd., for fast goods traffic.

A typical Irish station scene showing an up train from Cork at Charleville. The locomotive is No. 398, assembled from parts made at Woolwich, and fitted with driving wheels 6 ft. 1 in. in diameter. Photograph by A. G. Beatt, Athboy. In the upper photograph on this page is G.S.R. No. 500, the first of the modern 4-6-0 mixed traffic locomotives constructed at Inchicore Works. It is used on main line trains between Dublin and Cork. Photograph by courtesy of the Great Southern Railways.

The other 2–6–0 engines referred to have quite a history attached to them. Although they run on the standard Irish 5 ft. 3 in. gauge, they are in appearance similar to the class "N" 2–6–0 engines of the Southern Railway of England, being built in fact to the same design. How this came about is due to the fact that the original S.E. and C.R. Ashford design of 1917 was selected by the Government immediately after the War as a useful locomotive type for building at Woolwich Arsenal in order to keep the men there employed. Numerous parts for these engines were made there, and 50 finished engines were purchased by the Southern Railway. The various circumstances surrounding the manufacture of these 2–6–0s and their association with Woolwich have resulted in the use of the nickname of "Woolworths."

Some of the parts were disposed of as "Government surplus" to the Midland Great Western of Ireland. Parts for 12 engines were obtained by this company in 1924 and assembled at their Broadstone Works in Dublin. Then in 1925 the Great Southern as a group concern purchased 15 more lots and in 1930 a further six. The engines erected from the last lot were fitted with larger driving wheels than their predecessors, and so resemble the S.R. class "U" engines. It is interesting to recall that Mr. Maunsell, the designer of these Ashford "Moguls," was, before his appointment to the S.E. and C.R., in charge of the Inchicore Works of the G.S. and W.R. These handy engines are made good use of on many parts of the line.

With the demand for greater locomotive efficiency, many of the older G.S. and W. 4–4–0 engines have been rebuilt and brought up to date as much as possible, including many of the familiar "321" class of 1904, which were the standard express engines for many years. Among the latest locomotives for the Great Southern are the 0–6–2 tanks introduced for use between Dun Laoghaire and Dublin. An interesting feature in their construction is that the usual riveting of the tanks and cabs has given place to welding.

Great Southern locomotives are painted black and some of the coaches are finished with the lower panels in brown and cream upper panels and a grey roof. The latest vehicles, which are described on page 645, are, however, painted in crimson lake with black and yellow lining. G.S. and W.R. engines were once dark green and those of the M.G.W.R. blue.

In 1930 an experimental motor coach was put into service operated by Drumm storage batteries, and as a result it was decided that electrical operation should replace the steam suburban service between Dublin and Bray. This service is of an intensive character, and a special design of 2–6–2 tank was built for it a year or two previously. The battery trains, consisting of twin articulated units, were equipped for multi-unit operation, and a feature was the introduction of regenerative braking. There are two charging stations, one at Amiens Street (Dublin) and the other at Bray.

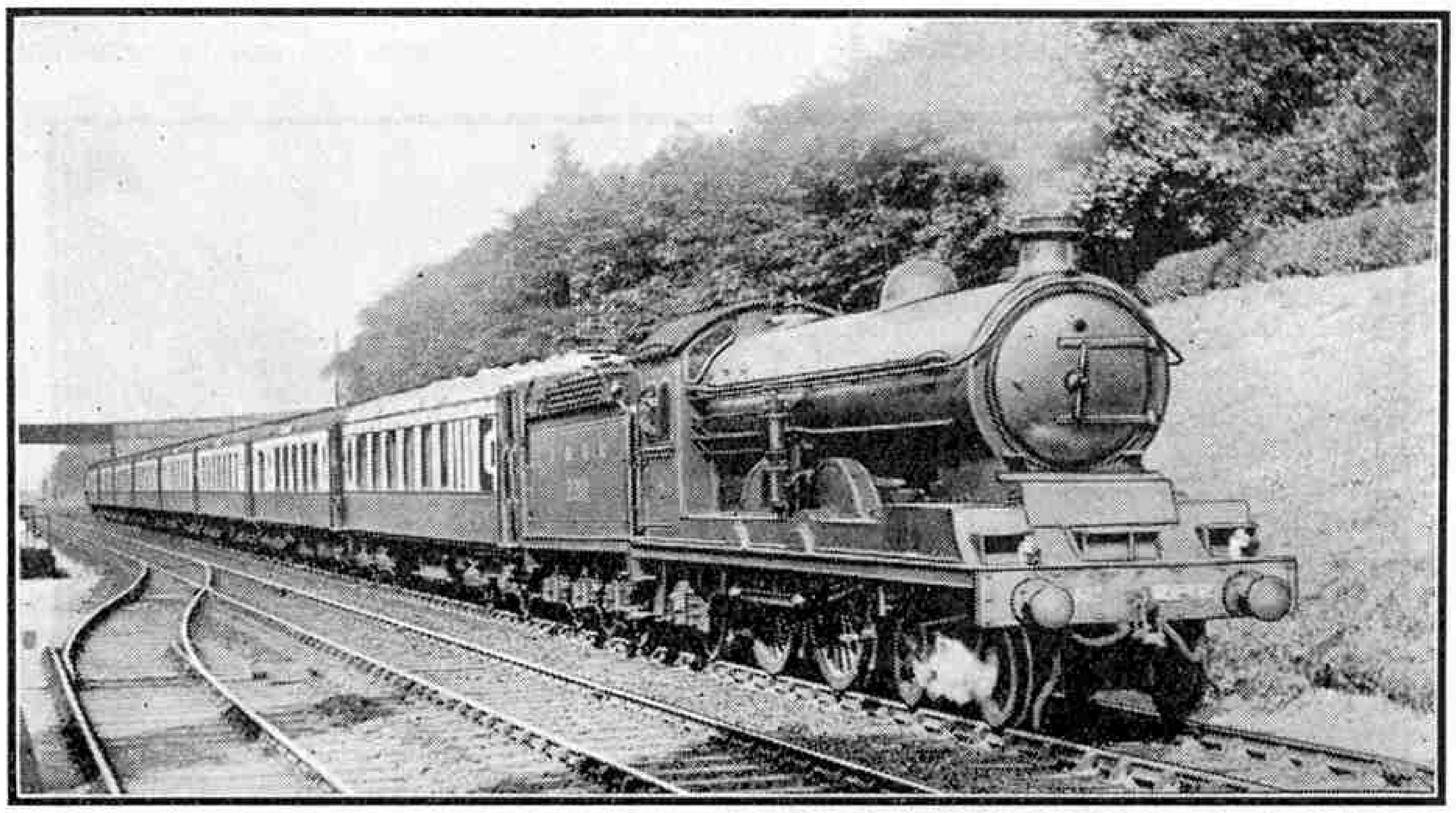
A feature of the section of the system that was the former Midland Great Western is the fact that much of the previous double track main line has now been converted to single track. In fact the whole of it is now single, except for a few miles out of Dublin, and of course at crossing places. Modern improved signalling methods, and the fact that the traffic is not unduly heavy, have rendered this step possible, thus reducing to a considerable extent the cost of maintaining the line, but without sacrificing the facilities for train movements. The electrical train staff system is employed.

In view of the mechanisation of permanent way operations that is such a feature of railway engineering practice to-day, it is interesting to note that the Great Southern Railways have for some years made use of the special "Morris" track layer. In order to provide steam for this machine one of the locomotives has a special connection from the dome to the leading buffer beam. Steam is passed from this to a similar pipe on the track layer, and so works the dynamo of this machine.

L.M.S.R. Locomotive News

The last three of the L.M.S.R. 4–6–2 class to be built this year, Nos. 6210-12, have been placed in traffic and are named respectively *"Lady Patricia," "Queen Maud"* and *"The Duchess of Kent."*

Several of the new 4–6–2s have been strenuously engaged on the Liverpool service for a week at a time in turn. The particular duty involved has commenced with the 12.10 a.m. train from Euston on Monday mornings and has included the working of the up and the down *"Merseyside Express"* each day, including Monday, by the same engine. The final return of the locomotive to Camden has been on the 9.30 a.m. from Lime Street on the following Sunday. This working has involved a mileage of well over 2,500 for the whole week.



The "Queen of Scots" Pullman on the N.E. Section of the L.N.E.R., headed by 4-4-2 locomotive No. 2212. This engine belongs to class "C7" but is an exception in having special cylinders arranged on "uniflow" principles. Photograph by courtesy of the L.N.E.R.

For a time recently the 4–6–2 "Turbomotive" No. 6202, that was described in the August issue, was working daily on the 10.40 a.m. from Euston to Liverpool, returning with the *"Liverpool Flyer"* at 5.25 p.m. On one trip with a load of 362 tons, and Driver J. Farrell of Edge Hill in charge on the footplate, the 152.7 miles from Crewe to Willesden were run at an average speed of 66.2 m.p.h., with a maximum of 86.6 m.p.h. On an occasion when tests were being made of its capacity for acceleration, No. 6202, with Driver L. A. Earl of Camden, covered the same distance at an average of 69.8 m.p.h. with a maximum of 90 m.p.h. The load was 331 tons.

It is of interest to note that the two Scottish locomotives withdrawn from service by the L.M.S.R., and now fortunately preserved, have been restored as far as possible to their original state. The Caledonian 4–2–2 locomotive No. 123 which carried the L.M.S.R. number 14010 at the time of its retirement, has been repainted in its original blue livery. "Jones Goods," No. 103 of the former Highland Railway, of the first 4–6–0 class to be put into service in Great Britain, has been restored to the familiar olive green of its original owners. It has also been refitted with its former type of double chimney with louvred openings at the front. Although the two locomotives may now be considered as "museum pieces," they are both in working order and still quite capable of working a train.

L.N.E.R. Locomotive Running

On the rare occasions when the G.N. "Atlantics" now appear on important L.N.E.R. expresses, other than the "Pullmans" and the Cambridge buffet car trains, they do not fail to put up remarkable work in spite of their age. Recently No. 4426, with Driver Worboys, the hero of the *"Queen of Scots"* run described in the September *"M.M.,"* worked the 5.45 p.m. from King's Cross with a load of 350 tons. Up the climb to Potter's Bar 46 m.p.h. was sustained, and Hatfield, 17.7 miles, was passed at 74 m.p.h. in 24½ minutes. A rapid recovery was made from a signal check to 25 m.p.h. at Welwyn North, and Hitchin was passed at 76 m.p.h. With a maximum of 81 at Arlesey, Peterborough, 76.2 miles, was reached in 80 minutes 12 seconds, or in a net time of 78 minutes. Up the ascent to Stoke Summit an average of 56.3 was sustained from Werrington Junction to the Summit box. Speed fell here to 47½ m.p.h., and Grantham was reached after an easy descent in 113 minutes 47 seconds, the distance being 105.5 miles. The schedule is 116 minutes.

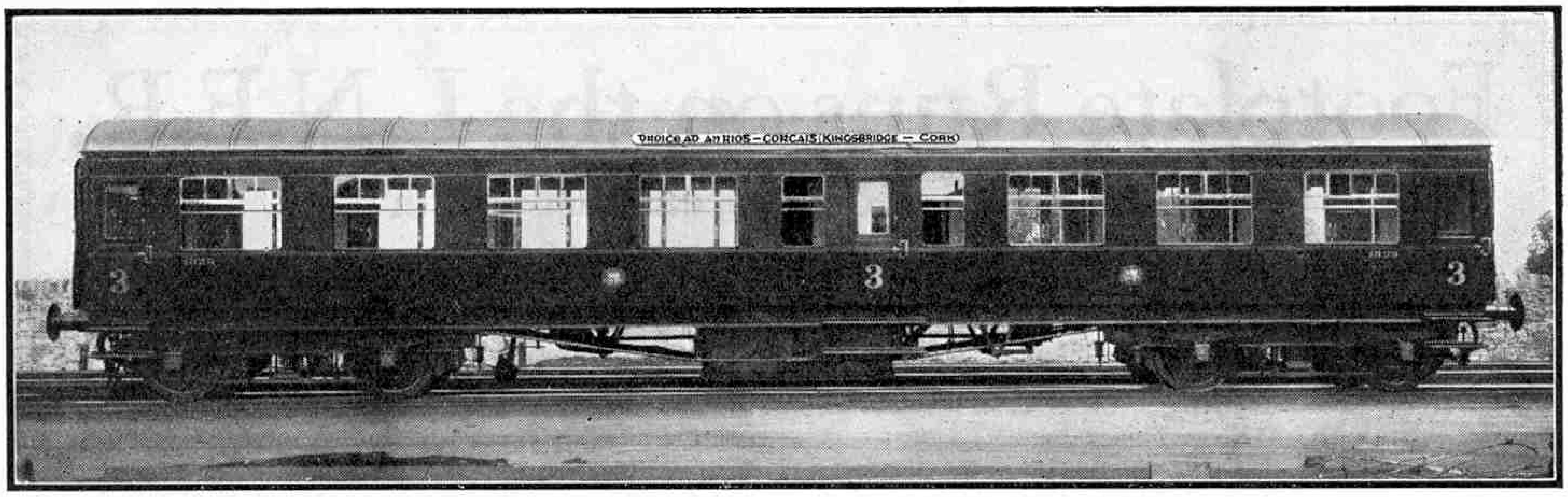
On a journey from Hull to Selby one of the 4–4–0 "Hunts," No. 374, *"The Sinnington,"* with 275 tons, passed Hessle 4.8 miles in 8 min. 2 secs. at 54 m.p.h. The 23.2 miles to Hemingborough were run at an average speed of 62.3 m.p.h. with a sustained rate of 67.5 at Staddlethorpe. Selby, 31 miles, was reached in 34 min. 39 secs.

More recently one of the "Shires," No. 307, *"Kincardineshire,"* with a load of 320 tons from Dundee to Edinburgh, stopped at Kirkcaldy in a faster time than either the "Pacific" or the "Mikado" locomotive, with 440 and 530 tons respectively, on runs recorded in recent issues of the *"M.M."* A speed of 65 m.p.h. was attained before Leuchars and a minimum of 50½ was sustained on the 1 in 160 gradient following. At Lochmuir summit the minimum was 32 m.p.h. After passing Burntisland 44 m.p.h. was attained, and Dalgetty Summit was reached at 31 m.p.h. Speed fell to 15 m.p.h. on entering the Forth Bridge, but exact time was kept to Edinburgh, which was reached in 86 min. from Dundee with 1 min. standing at Kirkcaldy, the equivalent non-stop time being 82 min.

With 440 tons, No. 1322, one of the 3-cylinder 2–6–0 locomotives of class "K3," ran the 44.1 miles from Darlington to York in 46 min. 41 secs. The schedule time was 49 min. The maximum speed was 67.5 m.p.h. and over the 21.1 miles from Otterington to Beningborough the average maintained was 64.5 m.p.h., smart work for a mixed traffic engine. These runs were recorded by Mr. O. S. Nock.

"The Railway Handbook"

The 1935-1936 issue of *"The Railway Handbook"* is a most useful publication containing brief details of the British and Irish Railway systems, together with a great deal of statistical information. It is essentially a work of reference, and in addition to the bare facts and figures contained in its pages, relative to such subjects as highest altitudes, fastest runs and longest tunnels, there is a useful section with notes on steam, electric and Diesel rail traction, railway rolling stock, permanent way and signalling. The scope of the matter dealt with is extremely wide and much of it cannot be obtained from any other single source of reference at a comparable price. It is published by the Railway Publishing Co. Ltd., 33, Tothill Street, Westminster, London, S.W.1, at two shillings and sixpence.



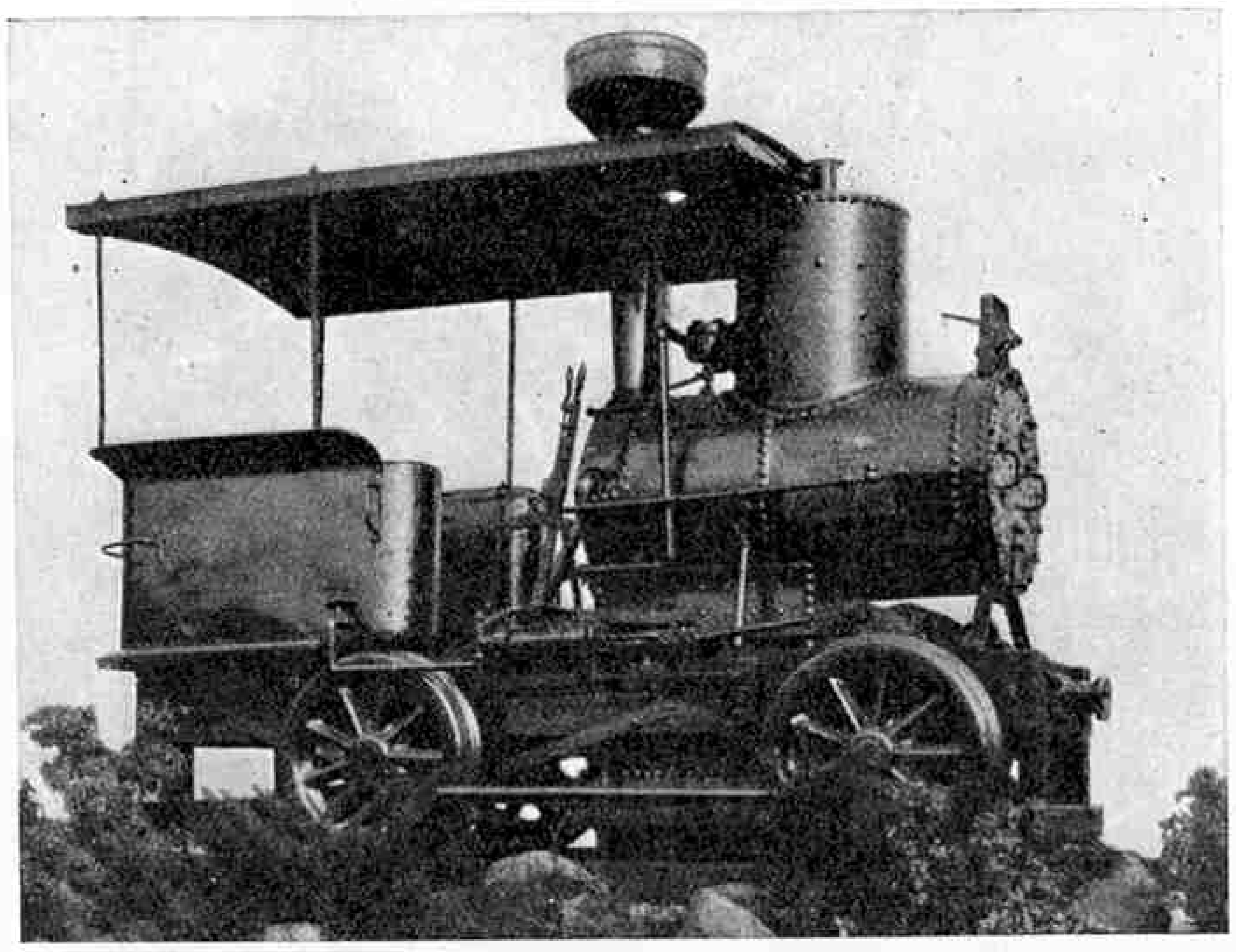
New Great Southern Rolling Stock

Some new vehicles for passenger service were put in to traffic by the Great Southern Railways of Ireland during last summer, and the first series have been used on the important "Day Mail" services between Dublin and Cork. The coaches are of the most up-to-date design and include all the latest improvements for the comfort of passengers. Each of the new vehicles is 60 ft. long and runs on two four-wheeled bogies of improved design. Special attention has been given to the suspension and springing arrangements in order to ensure smooth travelling. The body framing of the coaches is of teak, and the sides, ends and roofs are covered with flush-finished steel sheets.

The new coaches are of the side-corridor type, sliding doors giving access to the compartments from the corridor. These doors are arranged in conjunction with the wide and deep side windows, thus enabling passengers to have an uninterrupted lookout. The timber finish throughout the first-class and third-class coaches is polished mahogany, and all metal fittings, both inside and outside, are chromium plated.

Two dining cars, one of them provided with a kitchen, and a Travelling Post Office van, have been reconstructed to conform with the new standards. The interior arrangements of the dining cars have been greatly improved. Large side windows have been fitted with sliding shutter ventilators and curtains; new upholstering has been installed throughout, electric lamp stands have been provided on the tables, and all fittings are chromium plated. The kitchen and pantries also have been redesigned.

The modernisation of the mail van, which is of the double net type, and therefore does not require to be turned at each end of the journey, recalls the fact that it is over 80 years since the first Travelling Post Office Van ran in Ireland. This occurred on 1st January 1855, when the Dublin and Cork mail service was established.



In the upper photograph is one of the new coaches for the Dublin and Cork mail services. The destination board is lettered in both Erse and in English. Photograph by courtesy of the Great Southern Railways of Ireland. The lower illustration shows "Oregon Pony," a curious locomotive that was at work in 1862-3 on passenger and freight trains between Bonneville and Cascade Locks, Oregon, U.S.A. It was the first locomotive on the Pacific Coast, and is now preserved at the Union Railway Station, Portland, Oregon. Photograph by courtesy of the Editor of "The Railway Gazette."

"The Flying Scotsman's" Record

Year after year *"The Flying Scotsman"* maintains its extraordinary record of regularity in running. During the non-stop period last summer a mileage of 47,000 was covered with a loss of schedule of 3 min. only. Twice only were late arrivals made, and in neither case was the locomotive to blame, engineering work being responsible for the delays.

The demand on the locomotive varies considerably on different stages of the run. In the down direction really hard going is needed to cover the 105½ miles from King's Cross to Grantham in 114 min., but the succeeding time of 95 min. for the 82.6 miles on to York is very easy. The stiff initial timing is to keep the train well ahead of the 10.5 a.m., which stops at Grantham in 116 min. from London. Beyond York the schedule is about the same as that of the winter train, or perhaps a little easier. On a typical run during the non-stop period, with a heavy week-end load of 449 tons tare, 480 tons full, "Super Pacific" No. 2795, *"Call Boy,"* did excellently throughout. The London crew, Driver Haygreen and Fireman Middleton observed schedule very closely throughout to York. Over the 59.9 miles from Potter's Bar to Yaxley, an average of 68.8 m.p.h. was kept up with a maximum of 82 m.p.h. at Three Counties; Peterborough, 76.4 miles, was passed in 78¼ min., and with a fine climb to Stoke, where speed fell to 46 m.p.h. Grantham was passed in 113 min. 22 secs. On the easy timing to York the running was a mere "jog trot" after the previous high speed. There was a slight signal check approaching York, the only one on the whole journey; but with a quick recovery, Driver Haygreen handed over at Tollerton to the Haymarket crew dead on time and at exactly 60 m.p.h.

Driver Scott and Fireman Craig were now in charge. Speed rose to 69 m.p.h. on the dead level at Danby Wiske, and at Durham the train was 4 min. early. The pace was very much eased through the colliery area, however, and Newcastle was passed dead slow, 1½ min. early. Leisurely running sufficed to keep time on to Morpeth. A speed of 65-69 m.p.h. was maintained over the gentle ups and downs between Morpeth and Alnmouth, followed by a sustained 75 m.p.h. at Beal. Berwick was passed 6 min. early. The engine was justifiably eased on the long ascent to Grant's House, but 39 m.p.h. was sustained on the 1 in 200. The descent of Cockburnspath Bank, however, was taken "flying" with a top speed of 82 m.p.h. Very easy running along the Lothian Coast then sufficed to bring the train into Waverley, 2½ min. early. This run was recorded by Mr. O. S. Nock.

More "Halls" for the G.W.R.

Fifteen engines of the "Hall" class are now being turned out of Swindon Works. The names allotted to them are as follows: *"Clyffe Hall," "Cogan Hall," "Dunley Hall," "Faendra Hall," "Garth Hall," "Horsley Hall," "Hutton Hall," "Knolton Hall," "Mawley Hall," "St. Edmund Hall," "Toynbee Hall," "Wantage Hall," "Wimpole Hall," "Wolseley Hall"* and *"Woollas Hall."*

Larger Turntables on the L.M.S.R.

In addition to the programme of modernisation now being carried out at many L.M.S.R. Motive Power Depots, further improvements are to be put in hand. New and larger turntables, 70 ft. long, are to be provided at Camden and Aintree; Bletchley, Derby, Goole, Mold Junction, Windermere and Southport are to have 60 ft. turntables, and Derby is to have also a 55 ft. one. These new turntables will be of the articulated type, and three similar tables will replace existing equipment requiring renewal at Perth, Nottingham and Canklow.

Vacuum-operated turning gear is to be provided at 70 Depots in order to eliminate the turning of engines by hand which is necessarily a slow and arduous task.

Footplate Runs on the L.N.E.R.

VI.—The Leeds "Breakfast Flyer"

By a Railway Engineer

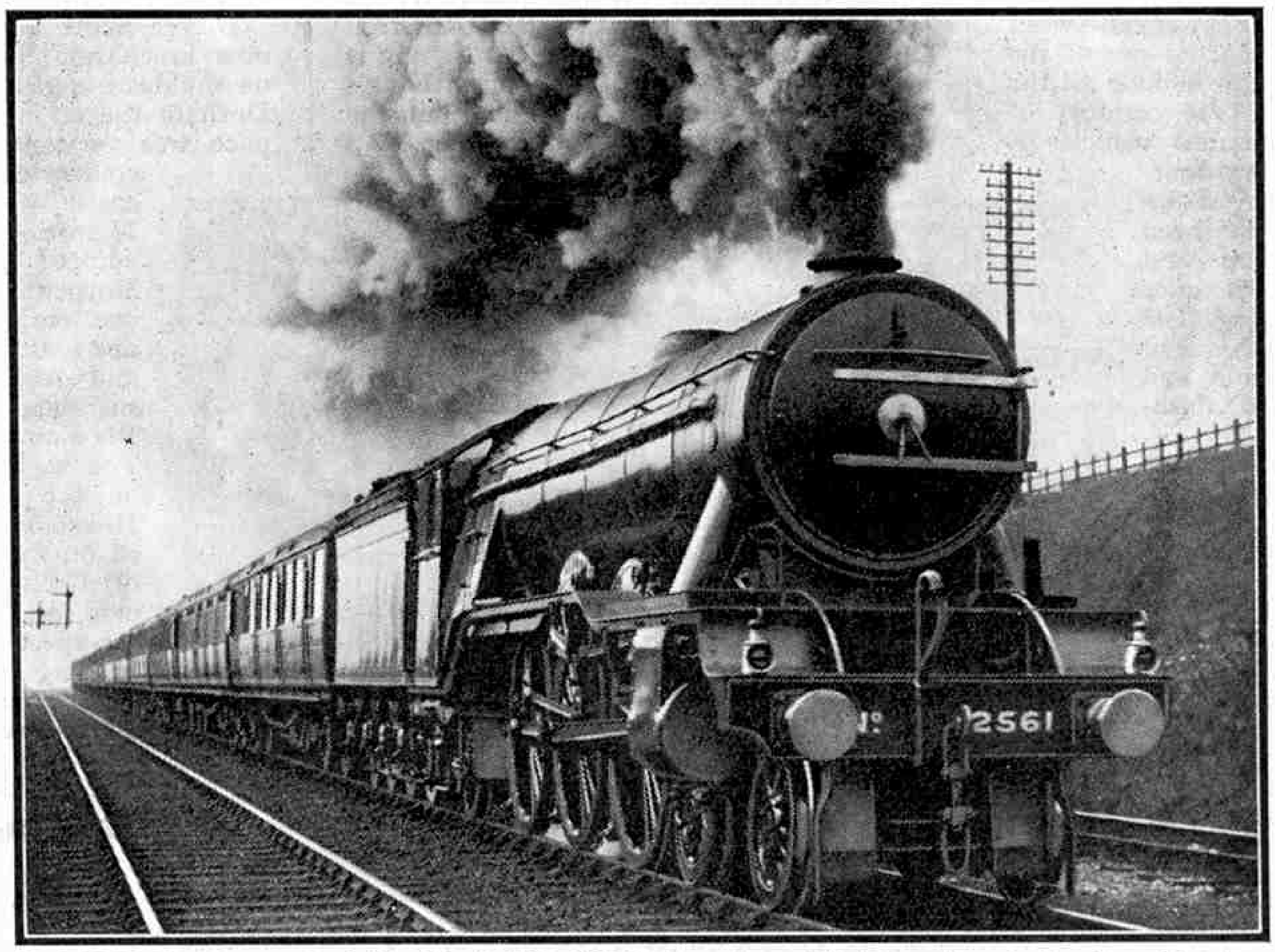
BOASTING the second fastest schedule on the L.N.E.R. and the seventh fastest in Great Britain, the 7.50 a.m. express from Leeds to King's Cross is deservedly a great favourite with travellers. This train, after some smart running between its early stops, makes a tremendous sprint from Grantham to London, 105½ miles in 100 minutes—an average of 63½ m.p.h.

Engines are changed at Doncaster and in the yard here I joined Driver Duddington and Fireman Atkins on a standard "Pacific," No. 2559, *"The Tetrarch."* On this occasion traffic was so heavy that a relief train was necessary; with a load of only six coaches a "Super-Pacific" got away in great style, and we had no trouble with signal checks from it. The express proper arrived from Leeds in charge of a big 3-cylinder Mogul of Class "K3." This was quickly detached and we backed gently down on to the train, which was loaded to 11 corridor coaches, 375 tons tare and 400 tons with passengers and luggage.

This train has an intermediate stop at Retford. The short run of 17½ miles from Doncaster, booked in 20 minutes start to stop, was smartly run with a maximum speed of 70 m.p.h. For the next stage, to Grantham, the 33 miles are booked to be run in 35 minutes, a very sharp timing because there is considerably more uphill than down on this stretch. Right at the start come 5 miles up at 1 in 200 to Markham summit. Full regulator was used almost immediately and as we picked up speed, the cut-off was gradually reduced from 65 per cent. at the start to 28 per cent. at Gamston signal box, 3 miles out. Speed had then risen to 46 m.p.h., and steadily continued to rise until we passed the summit at 49 m.p.h. The 5 miles from Retford had been covered in the fast time of 7¾ minutes.

Now cut-off was brought right back to 18 per cent., but the regulator remained full open. We touched 78 m.p.h. at Crow Park, kept up a fine pace across the Trent Valley, and reached Grantham almost exactly on time.

The main interest of the journey, of course, is centred in the "flying" run from Grantham to London, and for such a schedule our load of 400 tons behind the tender was a stiff proposition. The first 5½ miles are rising at 1 in 200, a very similar start to that from Retford. Driver Duddington started off with 60 per cent. cut-off and full regulator. *"The Tetrarch"* accelerated rapidly, and cut-off was reduced step by step until, only 2½ miles from the start, it was down to 30 per cent.; so it remained until Stoke summit. Speed rose to 47 m.p.h., and the summit box was passed in 8½ minutes from Grantham.



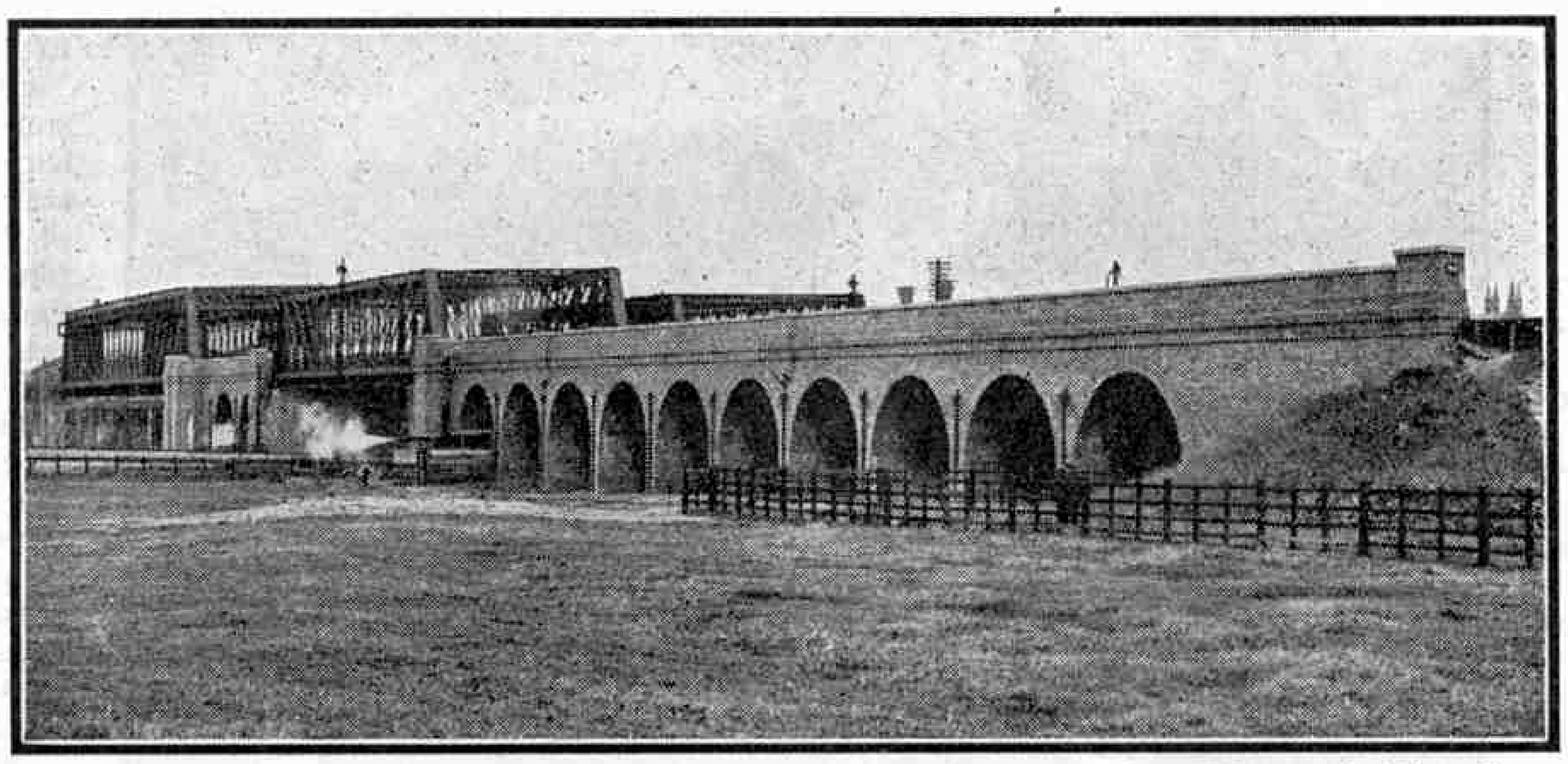
An L.N.E.R. Leeds express hauled by "Pacific" No. 2561 "Minoru," one of the "general service" engines of the class built in 1925. The illustrations to this article are reproduced by courtesy of the L.N.E.R.

The stretch of line from Stoke down to Peterborough is, to quote another "Pacific" driver, "A grand place if you are in a hurry," and rarely fails to provide thrilling running. On this trip of mine the tradition of "Pacific" speed was nobly upheld. Throughout the descent the regulator was kept full open, but cut-off was no more than 18 per cent. Speed rose with great rapidity on passing Stoke. Corby was passed at 75, Little Bytham at 83, and near Essendine we got up to a sustained 86 m.p.h. on 18 per cent. cut-off! Being on the footplate at such a speed is an extraordinary experience. In big modern engines, the bumping and hard riding that are so noticeable at 50 or 60 m.p.h. gradually seem to lessen as the speed rises, and the engines develop an almost uncanny smoothness when they get well into the eighties. *"The Tetrarch"* was no exception; the track on this section is of course superbly aligned, but even so the motion was amazingly steady. Another notable feature of this headlong dash was that never once was there any tendency for the steam to beat down and obscure the view from the cab. This great "spurt" took us over the 19.3 miles from Corby to New England North Junction at an average speed of 79 m.p.h. So we came through Peterborough, 29 miles from Grantham, in 28 minutes—exactly a minute early.

Speed was brought right down to 20 m.p.h. for the awkward curves through the station, and then the driver opened up to full regulator and 48 per cent. cut-off. We roared out over the Nene viaduct, getting a beautiful backward view of Peterborough Cathedral as we crossed; and speed was picked up steadily as we passed beside the numerous brickworks at Fletton. A very strong west wind had been experienced all the way from Doncaster, but up to now it had not affected us seriously; on the very fast stretch just completed, the line is sheltered in cuttings and in addition runs in a south-easterly direction. Beyond Peterborough, however, we caught the full force of the wind broadside-on.

A view of Grantham Station on the L.N.E.R. main line. Here the Leeds "Breakfast Flyer" stops before leaving on its 63.5 m.p.h. run over the 105.5 miles to King's Cross.

On the dead level from Yaxley onward Driver Duddington used 25 per cent. cut-off and full regulator, and yet speed did not rise above 62½ m.p.h. The effect of the wind can best be judged by comparing this with the run of *"Royal Lancer"* on the 1.20 p.m. "Scotsman," which I described in the May number of the *"M.M."* On that journey Driver Taylor was using 25 per cent. cut-off and only three-quarters regulator, instead of full, on the dead level north of York, and yet with a load of 520 tons speed was worked up to 67 m.p.h. This shows that the wind was equal to over 120 tons of train, and I calculated that in calm weather we should have attained a speed of little if anything under 75 m.p.h. Actually we were doing 62½ m.p.h.


The Nene viaduct at Peterborough, showing widening operations in progress. In addition to the River Nene, L.M.S.R. and Great Eastern section L.N.E.R. lines pass below the structure.

Right on to Hitchin we received severe buffeting, the 27 miles from Huntingdon to this point taking 25½ minutes instead of the very fast 22 minutes allowed. On the last 30 miles into London, however, the line is much more sheltered, and we made a truly thrilling finish. On 27 per cent. cut-off we sustained 49 m.p.h. up the 1 in 200 of Stevenage bank, accelerated rapidly to 60 on Langley water troughs, and took the rise to Woolmer Green at a minimum of 57 m.p.h. Here cut-off was brought back to 18 per cent., but the regulator was still kept full open. On the 1 in 200 down through Welwyn tunnels *"The Tetrarch"* simply raced away, while to emerge from the south tunnel, and a few seconds later to be sweeping across the dizzy height of Digswell viaduct at 70 m.p.h., was an experience that made one fairly gasp. Hatfield was passed at 77½ m.p.h., the 5-mile rise to Potters Bar was taken at the remarkable minimum speed of 63 m.p.h., and then, for the first time on the journey, except of course for Peterborough slack, the regulator was pulled back from the full-open position to about three-quarters.

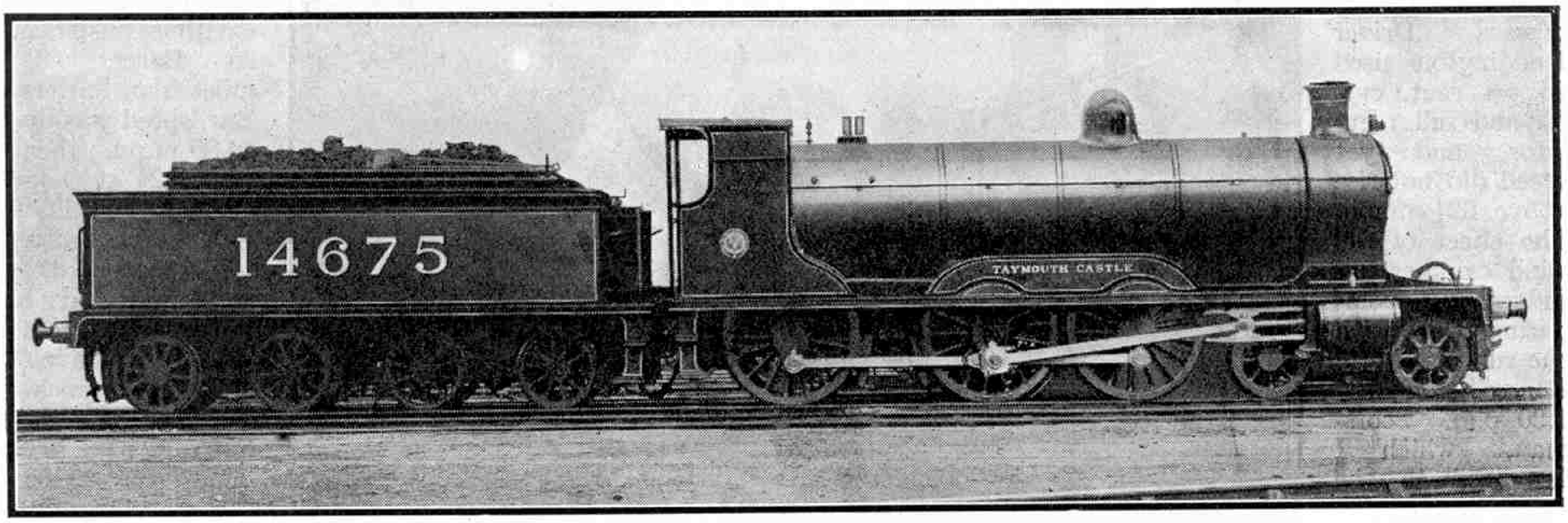
We had covered the 92¾ miles from Grantham to Potters Bar in 91¾ minutes, but unfortunately, owing to the wind, we had lost over four minutes, and time-keeping was out of the question. The crew made a tremendous final effort, however, and the descent into London was a breathlessly exciting business. At Barnet, 3½ miles from Potters Bar, speed was up to 80 m.p.h.; then came 82½ at Oakleigh Park, 86 at New Southgate, and finally 87½ m.p.h. through Wood Green. In and out of tunnels at an ever-quickening pace, culminating in the breath-taking sweep over the junctions at Wood Green, was an experience never to be forgotten.

But now steam was shut off and the final slowing down had begun. We passed Finsbury Park, 103 miles, in 99¾ minutes; signals were momentarily against us at Holloway, and about a mile outside King's Cross we had a slow-up to 10 m.p.h. for permanent way repairs. So we reached the terminus, 105½ miles from Grantham in 104¾ minutes, of which the final check cost a minute. It is difficult to estimate exactly how much time was lost through the wind, but I think we could have completed the journey in 99 minutes in calm weather, inclusive of the final check. With a 400-ton load this was a fine piece of work.

I was able to make a fairly close estimate of the coal consumption on this trip. There is always some variation between the individual engines of a class, but *"The Tetrarch"* proved to be exceptionally economical. The coal fired between Doncaster and King's Cross averaged less than 40 pounds per mile. Of course she was running for long periods on only 18 per cent. cut-off, and another remarkable point was that the last shovelful was put on at Woolmer Green, 23½ miles from King's Cross. Despite the tremendous pace at which we were running over this last lap, the engine continued to steam very freely, and we went over Potters Bar summit with the safety valves blowing off. It was a magnificent all-round display of "Pacific" ability, especially of sustained steaming power.

Locomotive Progress in the Highlands

Development of the 4-6-0 Type

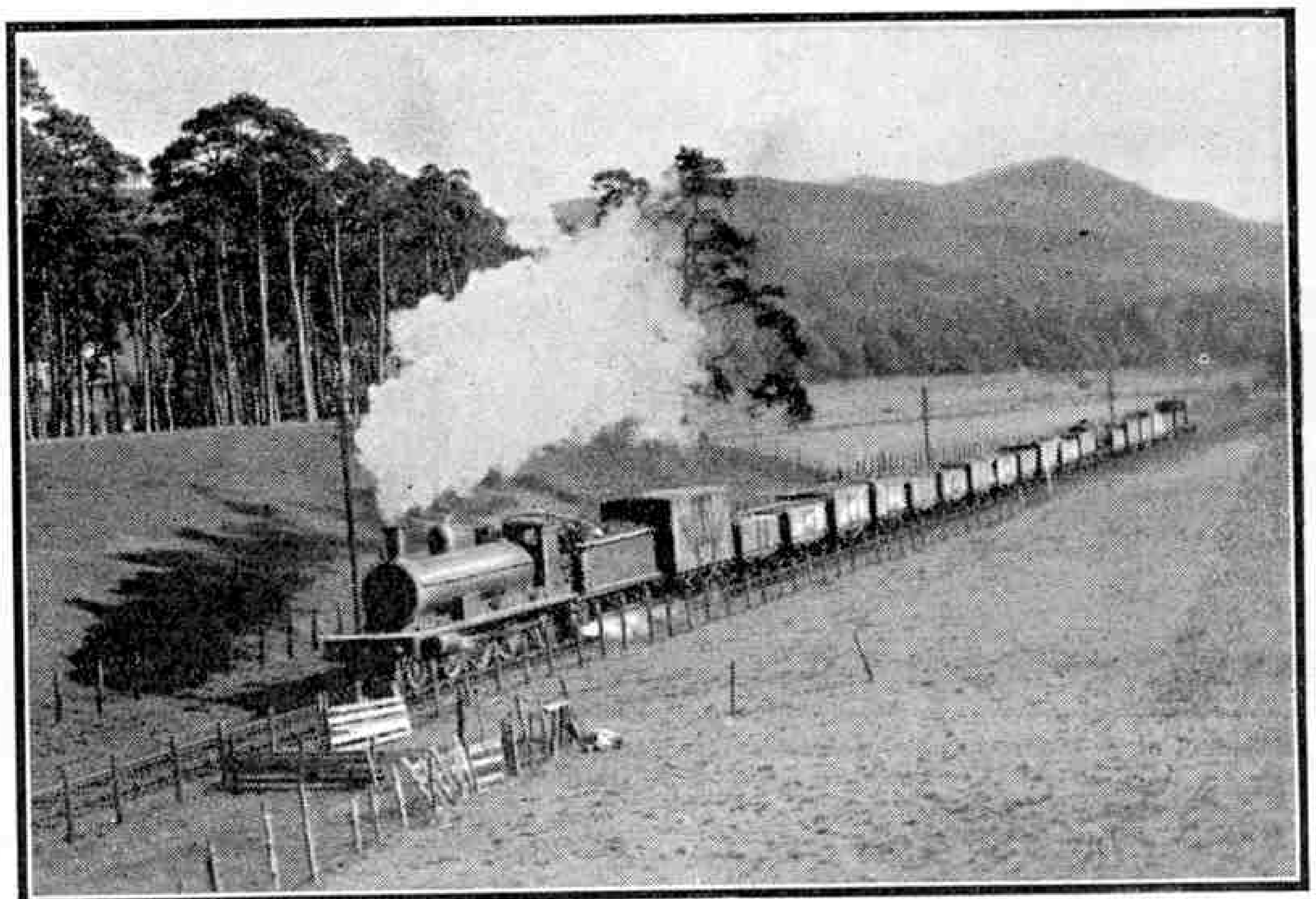


"Taymouth Castle," the first of the well-known Highland "Castle" class. This photograph shows the engine in the L.M.S.R. red livery as adopted for all passenger locomotives in the early days of grouping. This and the upper photograph on the next page are reproduced by courtesy of the L.M.S.R.

ACCUSTOMED as we are to modern locomotive giants of the 4–6–0 type, it is little surprising to reflect that this particular wheel formation was first used in this country over 40 years ago. Since that time its development has been continuous and as far as one company, the G.W.R., is concerned, the familiar 4–4–0 is obsolete for express classes, and the whole of the express service is operated by 4–6–0 engines.

The extreme difficulty of the gradients on the Highland Railway, now a section of the L.M.S.R., which was responsible for the introduction of the 4–6–0 type into British locomotive practice, would have furnished sufficient excuse for the advent of such engines years before 1894 when the type actually appeared. However, the old Highland 4–4–0 engines that had gone before were very sound performers, and in their time were among the most remarkable engines of all their contemporaries in Europe. They were designed by the famous Mr. David Jones, who was connected with the company for many years; and one of the features common to them all was the employment of outside cylinders. Thus when the 4–6–0 type was introduced the same characteristics were incorporated and, in spite of being a new type, the engines bore all the hallmarks of the "Jones" regime.

In view of subsequent developments it is interesting to note that the new engines were considered monsters by the enginemen at first, owing to their size; but as the "big yins" showed their capacity they quickly became accustomed to them. Although designed primarily for goods working—they were familiarly known as the "Big Goods"—they have carried out a great deal of mixed traffic working in their time.



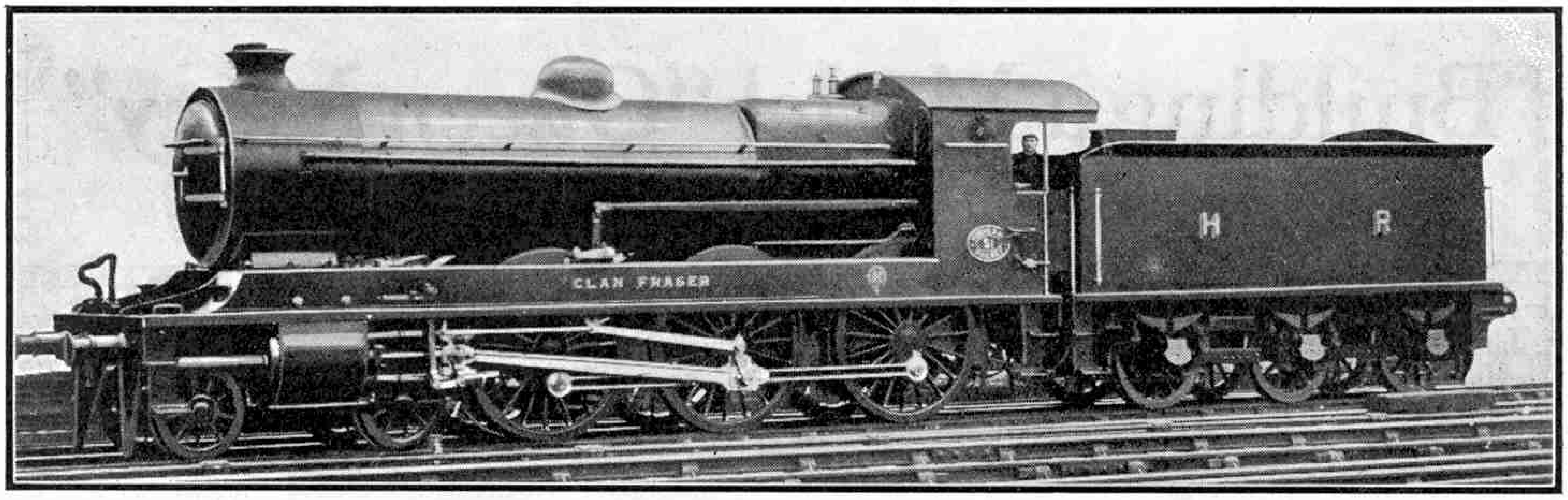
An interesting photograph showing a goods train on the Highland section of the L.M.S.R., hauled by No. 17920 of the "Jones Goods" class. This and the lower photograph on the next page were taken by our reader J. M. Craig, Farnborough, Kent.

In appearance they conformed to the Highland standards of the period when they first took the road, and were provided with the curious "louvred" chimney peculiar to "Jones" engines. This consisted of an inner and an outer casing with an annular space between them. Exhaust steam and the products of combustion passed up from the smoke-box through the inner chimney. In the front, about half-way up the outer casing, were placed several horizontal slits in the form of louvres opening into the space between the two. This scheme was in a sense an anticipation of modern smoke-deflecting apparatus, the idea being that the draught through the louvred opening would force the smoke well up out of the chimney top and prevent it from beating down over the cab, especially when running downhill without steam. It would assist also in preventing any "blow-back" such as is liable to occur when the regulator is closed, unless the blower is put on beforehand. If this is not done the fire is liable to blow back through the fire hole into the cab, owing to the cessation of the steam blast and its draught action on the fire, with perhaps dangerous and certainly unpleasant results to the enginemen.

A distinctive feature of the front end was the fitting of the once common "wings" at the side of the smoke-box. These took the form of the extension sideways, below the centre line of the boiler, of the front plate of the smoke-box. A very "solid" appearance was imparted to an engine in this way, and the scheme was much practised in former years. In most cases, however, the wings have been removed from those engines that once had them, for such trimmings apparently have little place in modern locomotive practice.

An interesting detail is that the two columns of the safety valves, instead of being fitted "fore and aft," as is usual, were placed side by side. This practice has been revived in more recent times in L.M.S.R. Horwich designs such as the giant "Baltic" tanks and the "Standard Moguls."

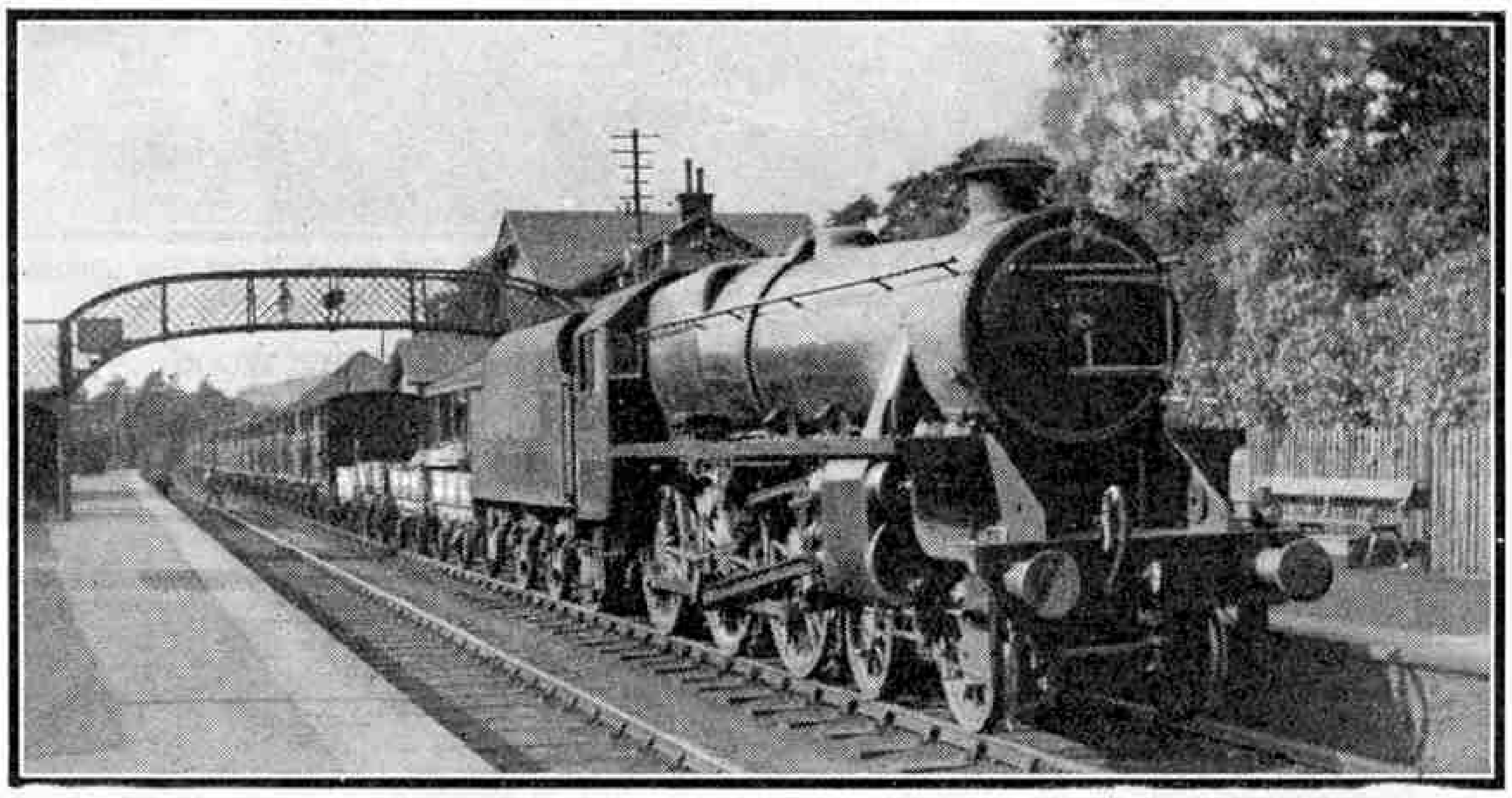
The cab still survives in its original form, although the "Jones" chimney, and smoke-box side wings have disappeared. It shows its relation to the Stroudley cab formerly used on the Brighton system, but first applied previously when Stroudley was in charge at Inverness, in having a straight top edge to the spectacle plate.



A curious "squareness" is thus imparted to the whole structure, which is reproduced also in the shape of the look-out windows, and in the openings in the side sheets. On the other hand the front corners of the cab are rounded, and the roof is necessarily domed owing to the straight topped spectacle plate.

In view of the interest of the type as a pioneer British design, it is pleasing to note that one of these engines is preserved by the L.M.S.R. and is repainted in its pre-group livery of green. Though they were the first engines of the 4–6–0 type in service in this country, the type had long been in use in America.

The possibilities of the 4–6–0 type, and no doubt the work of the "Jones Goods" engines, seem to have impressed the Locomotive Superintendent who followed their designer at Inverness. This was Mr. Peter Drummond, one of two famous brothers, both of what we may term the "Stroudley" school of locomotive engineers. At all events in 1900 another design of 4–6–0 with outside cylinders was introduced to Highland metals for passenger work. This was the famous "Castle" class that bore the brunt of Highland express work for so long. With these engines the orderly system of naming initiated with the 4–4–0 "Small Bens" of 1896 was persevered with, in striking contrast to former Highland practice. Previously engines were named in a very indiscriminate manner, and often had their names changed at very short notice, when perhaps they were allocated to a new district with which the original name had no local associations.



The upper photograph shows "Clan Fraser," of the last class of express locomotives built for the Highland Railway. The engine in the lower illustration is No. 5029 of the latest L.M.S.R. 2-cylinder "5P5F" 4-6-0 class.

The first of the class was "*Taymouth Castle*," now L.M.S.R. No. 14675, which appears in one of our illustrations. The characteristics that marked the "Drummond" family of locomotives were all incorporated, except the usual inside cylinder design and, remarkably enough, the smoke-box "wings." The chimney and cab followed the usual outlines, and the tenders were of the 8-wheeled type with inside bearings, such as had recently come out on the L.S.W.R. under the superintendence of Mr. Dugald Drummond. Additions were made to the "Castles" from time to time, and as far as the main Perth to Inverness line is concerned they became practically the standard express locomotive of the Highland Railway. In 1910 one of them, then No. 146, "*Skibo Castle*," ran in comparative trials with a North British engine, 4–4–0 No. 867, between Blair Atholl and Dalwhinnie on home metals and between Perth and Kinross in foreign territory.

The position of the "Castles" on the Highland was not assailed for years, and in 1913 and 1917 seven further engines of the class altogether were obtained. These incorporated modifications to the original design, Drummond having left Inverness in 1912 for the G. & S.W.R. at Kilmarnock. Thus the latest editions of the "Castle" class have an extended smoke-box in place of the short Drummond design, larger driving wheels 6 ft. in diameter, and 6-wheeled tenders. Grouping has produced no real change in the "Castles," except of course the replacement of their neat green uniform by a dingy black coat, after an intermediate spell in all the post-grouping glory of "Midland red."

The next class of 4–6–0 engines were remarkable in that, although built in 1915 for the Highland, they were not put into service on that line until after grouping. These were to have been the "River" class, and the first two were No. 70, "*River Ness*," and No. 71, "*River Spey*." It was found that they were too heavy for the Highland system, however, and the six of the class were then sold to the Caledonian Railway. There they became chiefly "fast goods" engines, although doing some passenger work. With the formation of the L.M.S.R., however, the "Rivers" came back to their intended sphere of action. They are quite striking-looking engines, and in certain features they may be considered to have anticipated the useful "5P5F" L.M.S.R. 4–6–0 engines of Mr. Stanier's design, that are now working on the Highland system. They are in fact particularly modern in looks for engines built 20 years ago.

In the meantime, however, the removal of the "Rivers" to the Caledonian, where they became the "938" class, left the Highland system in the same position as before. Owing to war conditions and the curtailment of much of the traffic that formed the bulk of peacetime passenger business of the Highland line this might not have been so bad. The shortage of locomotives was acute, however, as special Naval traffic had to be dealt with owing to the formation of an Admiralty dockyard at Invergordon and the selection of Scapa Flow as the Headquarters for the Grand Fleet.

The "Clans" of 1919 continued the use of the Belpaire fire-box, the 6 ft. diameter driving wheels, and other "River" characteristics such as outside Walschaerts motion. They soon became the premier Highland engines for passenger duties and have proved capable of remarkable work. The amalgamation saw them assisted in the hardest duties by the repatriated "Rivers"; and now, strangely enough, "Clans" are to be found on former Caledonian metals. The duties of the Callander and Oban line require capable locomotives of moderate weight, and most, if not all, of the "Clans" have been transferred to this work.

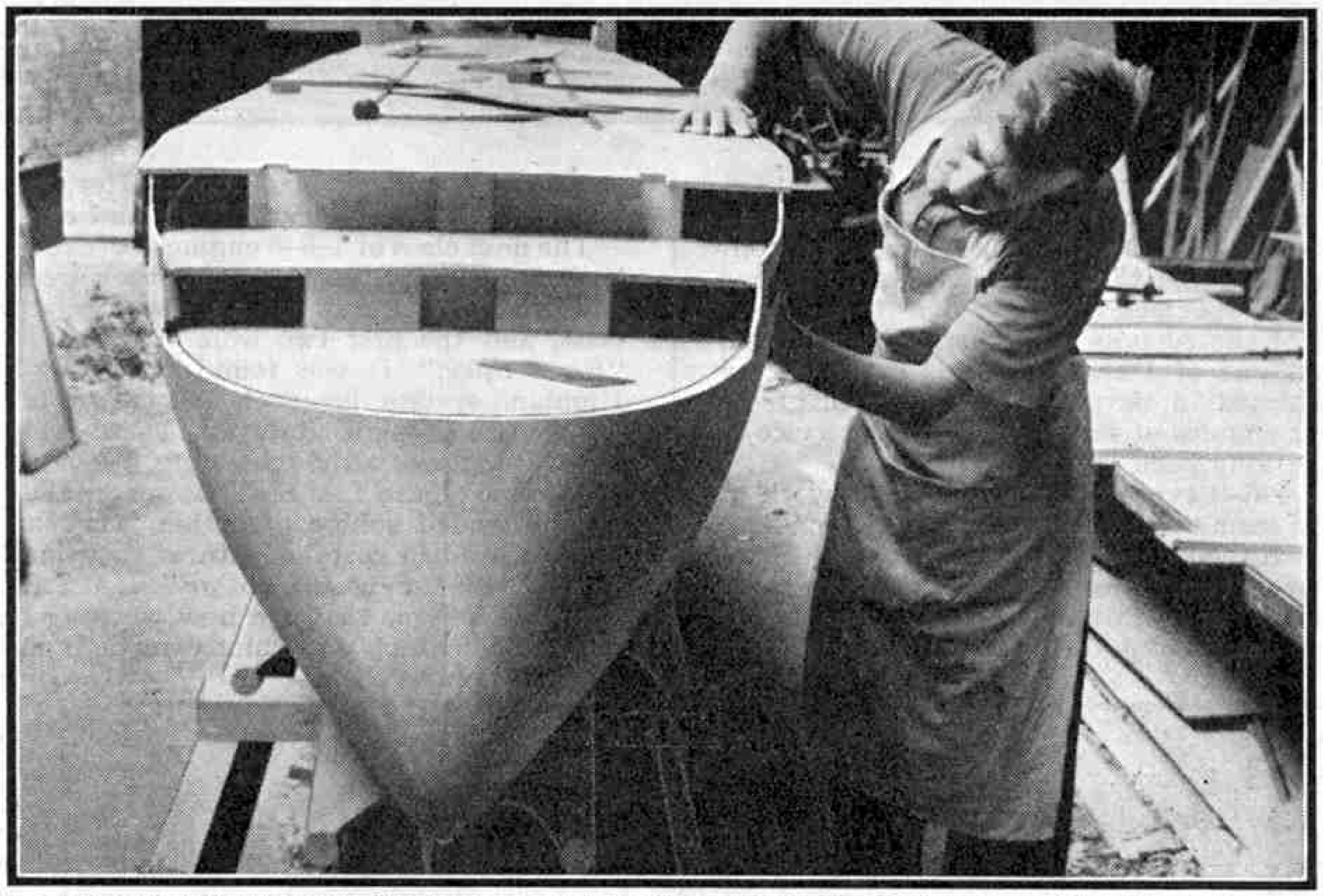
In striking contrast to the pioneer "Jones" 4–6–0s, the latest engines of this wheel arrangement to be added to the motive power of the Highland section are the "5P5F" 2-cylinder mixed traffic locomotives designed by Mr. W. A. Stanier. These represent an up-to-date expression of the 4–6–0 type of locomotive with driving wheels of medium size for mixed traffic working, and particularly adapted to the climbing of gradients.

The original "Jones" goods locomotives, therefore, introduced in view of the peculiar difficulties of the Highland line, have been followed by a succession of locomotives of the same wheel type. Each class has represented the most approved practice of its period, and it is still possible to see examples of each of these classes at work.

Building a Model "*Queen Mary*"

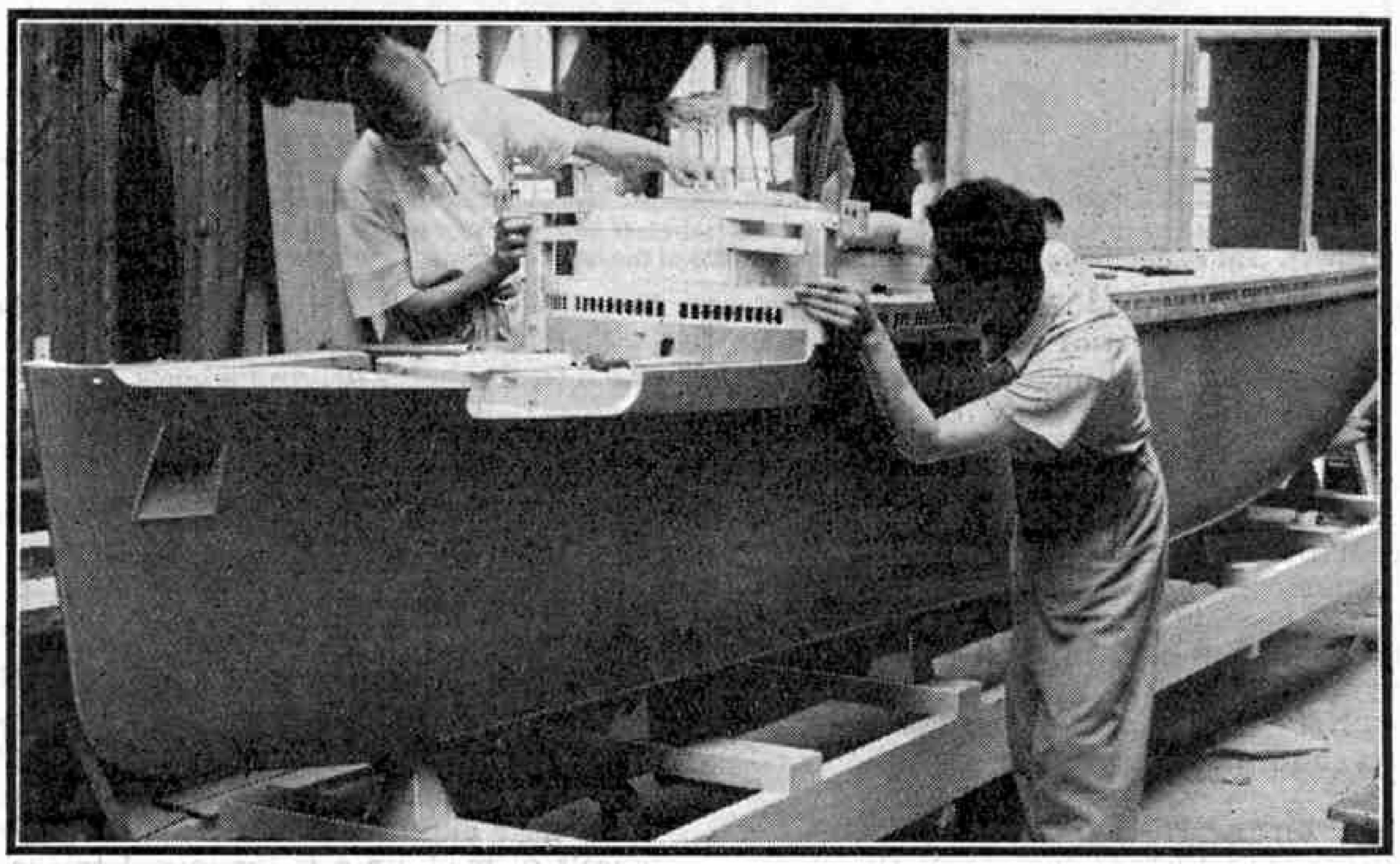
A Triumph of Craftsmanship

GEOGRAPHY books do not give Northampton as being among the great shipbuilding centres. Nevertheless, in this Midland town, as far from tide-water as it is possible for an English town to be, is a shipyard that would fascinate the average boy even more than the gantried sky-lines of the Clyde or the Lagan. Here are built by Bassett-Lowke Ltd. realistic models, accurate to the most minute details, for the leading shipping companies of the world.



On the stocks at Northampton. The "Queen Mary" model's hull takes shape and decks are fitted. The photographs to this article are reproduced by courtesy of Bassett-Lowke Ltd.

In this shipyard there has been completed to the order of the Cunard White Star Line a wonderful model of the "*Queen Mary*," the vessel which everyone in Britain hopes will outstrip all her predecessors when she makes her proud challenge for the Blue Riband of the Atlantic. This model has been designed to enable ship lovers in the United States to gain a realistic impression of what this magnificent vessel will be like when her deep-noted siren blast first scares the gulls from the Statue of Liberty.



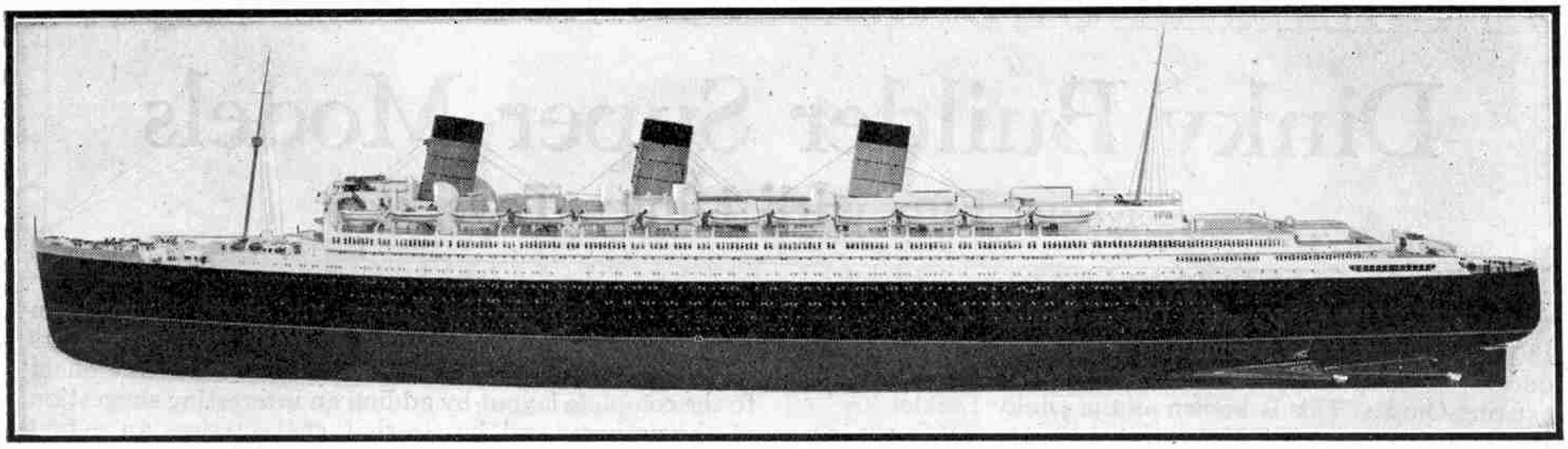
Testing the superstructure for the bridge. The success of the model depends to a large extent upon the accuracy with which this work is carried out.

At normal high-pressure working the model, which is the largest ever built in this country, would have taken at least six months to complete; but Cunard White Star wanted it in three months, and the task was carried out. The model is built to a scale of a quarter of an inch to a foot, and the makers had to contend with the difficulty that they were fashioning a replica of a ship whose visible details, at the time their work was in progress, were not completely known.

The model is 21 ft. 2½ in. long, 2 ft. 6 in. in the beam, and 5 ft. 9 in. high. The first stage of the work was the selection of suitable wood for the hull. After a careful country-wide search of the timber yards, long planks of seasoned African mahogany were chosen. Planks of this wood about 2 in. in thickness were sawn to form a rough shape, moulded and glued together in an outline, and then finished off to the beautiful lines of the hull by templates operated by skilled woodworkers. Various templates had to be made for different sections of the hull. While fashioning the hull the woodworkers also hollowed out the interior. Empire wood, New Zealand Kauri Pine, was chosen for the decks, and close-grained hard wood was used also for some of the deck parts.

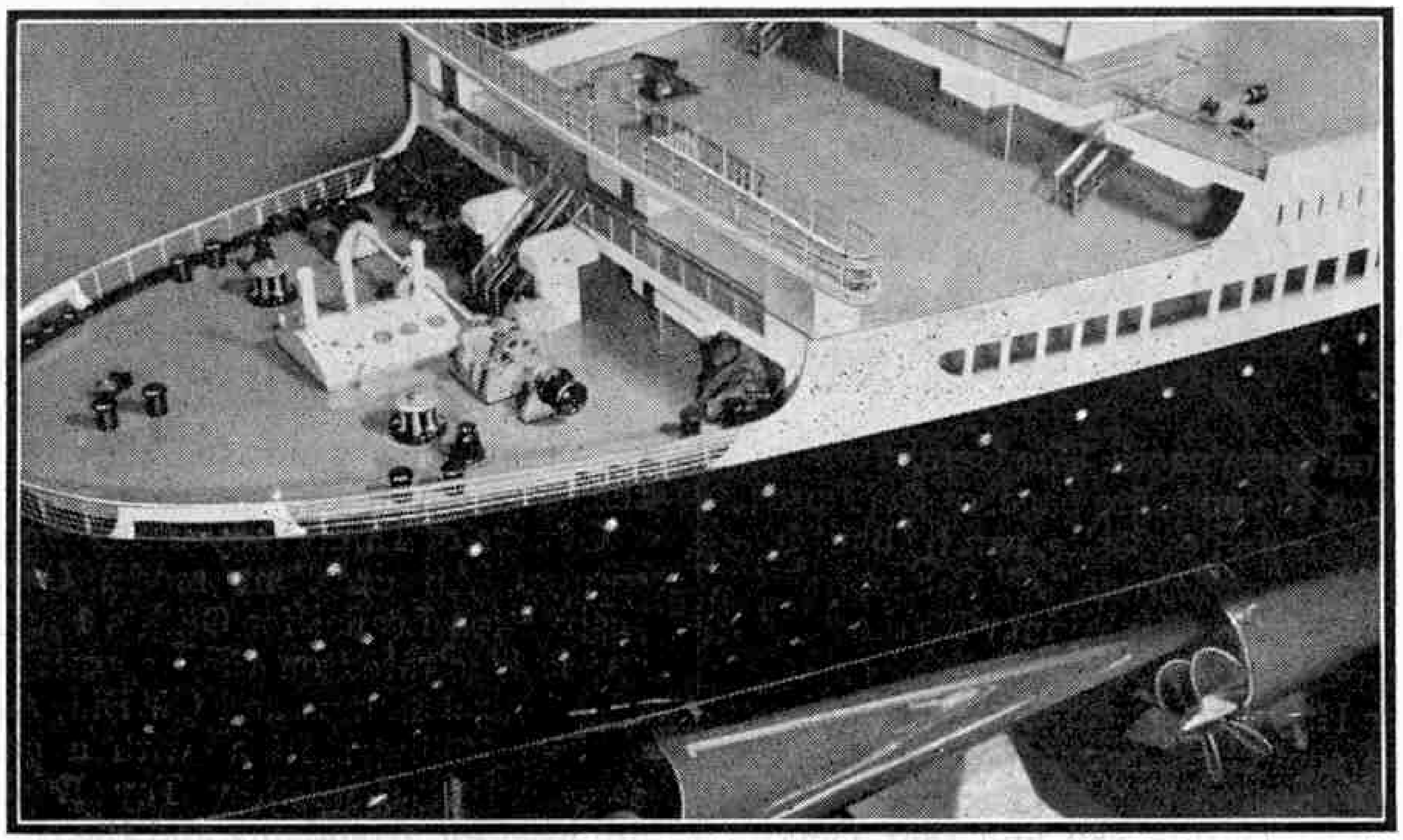
From scale drawings the deck parts were made with the utmost fidelity to detail. Hull and deck were then passed on to the paint shops. Dozens of coats of paint were applied to bring the bare wooden hull to the gleaming brilliance of the finished real thing. Steady fingers held the tiny paint brushes that picked out the deck planks in lines to scale; over two miles of lining had thus to be done.

While the woodworkers were carefully intent on their job, equal methodical activity ruled in the metal shops. Here, working with correct drawings to scale for every small part—winches, ventilator cowls, funnels, davits, anchors, propellers, bollards, etc.—workers in almost every known variety of metal put the utmost degree of their craft into their task. Castings of the more



solid fittings, like winches, were made in the foundry in gun metal or brass, or some other non-ferrous metal. They were finished by hand, and had tiny details about the size of pin heads added to them by super-skilled model makers. Hollow parts and flat parts were wrought from sheet or strip metal, including the funnels, port-holes, window frames and sidelights. Parts like stanchions were drawn from fine rod.

The model makers even made their own tools to carry out the work on the model. Skilled machinery makers on Bassett-Lowke's establishment fashioned out special press tools for stamping out parts like sidelights, portholes, and small windows, of each of which several hundreds were required. After being stamped out, each part was carefully finished by hand. The funnels—each of which had to be made individually to conform to the raked effect of those of the real ship, the first being higher than the second and the second higher than the third—were rolled out in sheet brass. Banding and edging were brazed on the funnels. All small parts like hatchways, ladders, syrens, and staging were tried in position before despatch to the paint shop or removal to the plating shop for plating in bronze, silver or gold.



The upper photograph shows the finished model, a masterpiece of design and craftsmanship. The lower photograph is a close-up view of a section of the model showing the perfection of detail.

In this model an entirely new departure in finish was employed. To get the true impression of what the ship will look like at sea, it is essential that the glazing should be such as to give a reflection similar to that of the sea in the gleaming paintwork of the real ship. For this and similar purposes Dutch modellers favour glass or nickelled metal; but with the *"Queen Mary"* model Bassett Lowke's experiment in employing bexoid in mottled green gave a remarkably successful and superlatively realistic result.

When all the parts were made they were carefully counted, for even a missing bollard or an additional one would transform the most expensive model into an imperfect representation, judged by the exacting standards of those whose business is governed by absolute fidelity to scale and detail.

Then came the most spectacular and interesting portion of the building of the model. Hull and parts were taken for assembly to a special dust-proof roof, principally made of glass so as to afford the workmen the maximum amount of natural light for their delicate job. Drill experts drilled the hull for each small part. Stanchions were fitted and hand rails threaded—to thread the hand rails holes in .22 gauge wire had to be bored in the stanchions—companion ways were secured from deck to deck, lifeboats were perfectly balanced in the accurately made davits. This work, and the erection of a host of other deck and superstructure fittings, took days of painstaking labour.

In only one detail does the model vary in external appearance from the real ship, and this variation has been purposely made. In portions of the upper decks the deck head of the decks below has been cut away, and strips of glass fitted in the apertures. This enables people to see the beautiful detail of the lower decks, which otherwise would have been concealed.

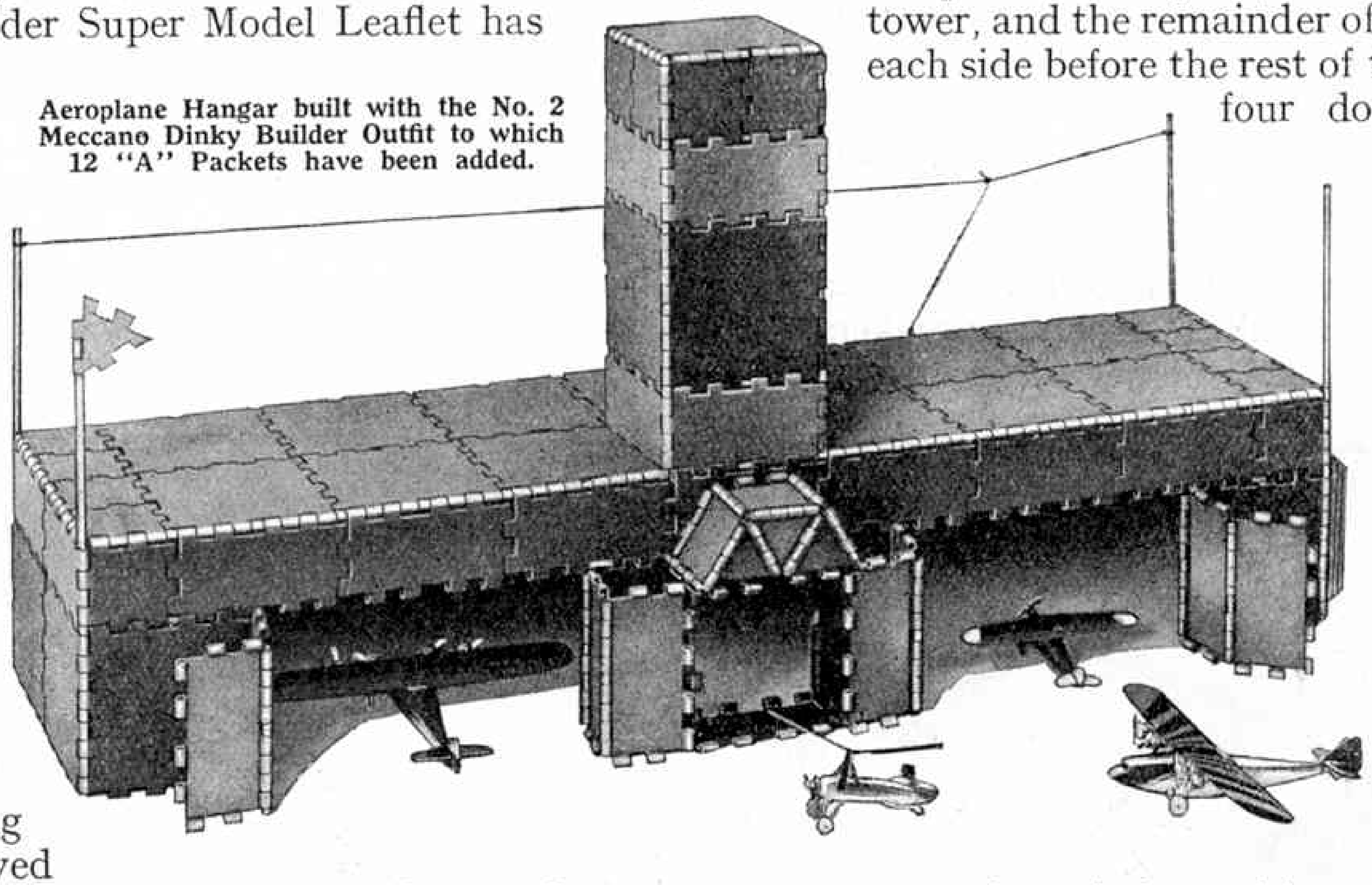
The *"Queen Mary"* model sailed away from her inland slipway by road as far as Castle Station, Northampton. Police held up the traffic while the model which, mounted on a cradle slung on a truck, towered above the shop fronts, was carefully hauled through one of Northampton's main streets. At the station a special crane hoisted the model into the specially ordered railway van, and away it went to the Shipping, Engineering and Machinery exhibition in London, its temporary resting place before being shipped to New York by the Cunard White Star motor liner *"Britannic."*

The prototype of this fine model is now in the fitting-out basin at the shipyard of her builders John Brown and Co. Ltd., Clydebank, and is almost completed. She has an overall length of 1,018 ft., a beam of 118 ft., and a depth of 135 ft. from keel to top of superstructure, and has 12 decks. The main propelling machinery will consist of Parsons' type single reduction geared turbines driving four propellers, and will have a total output of about 200,000 s.h.p.

Dinky Builder Super Models

More Fun with Dinky Toys

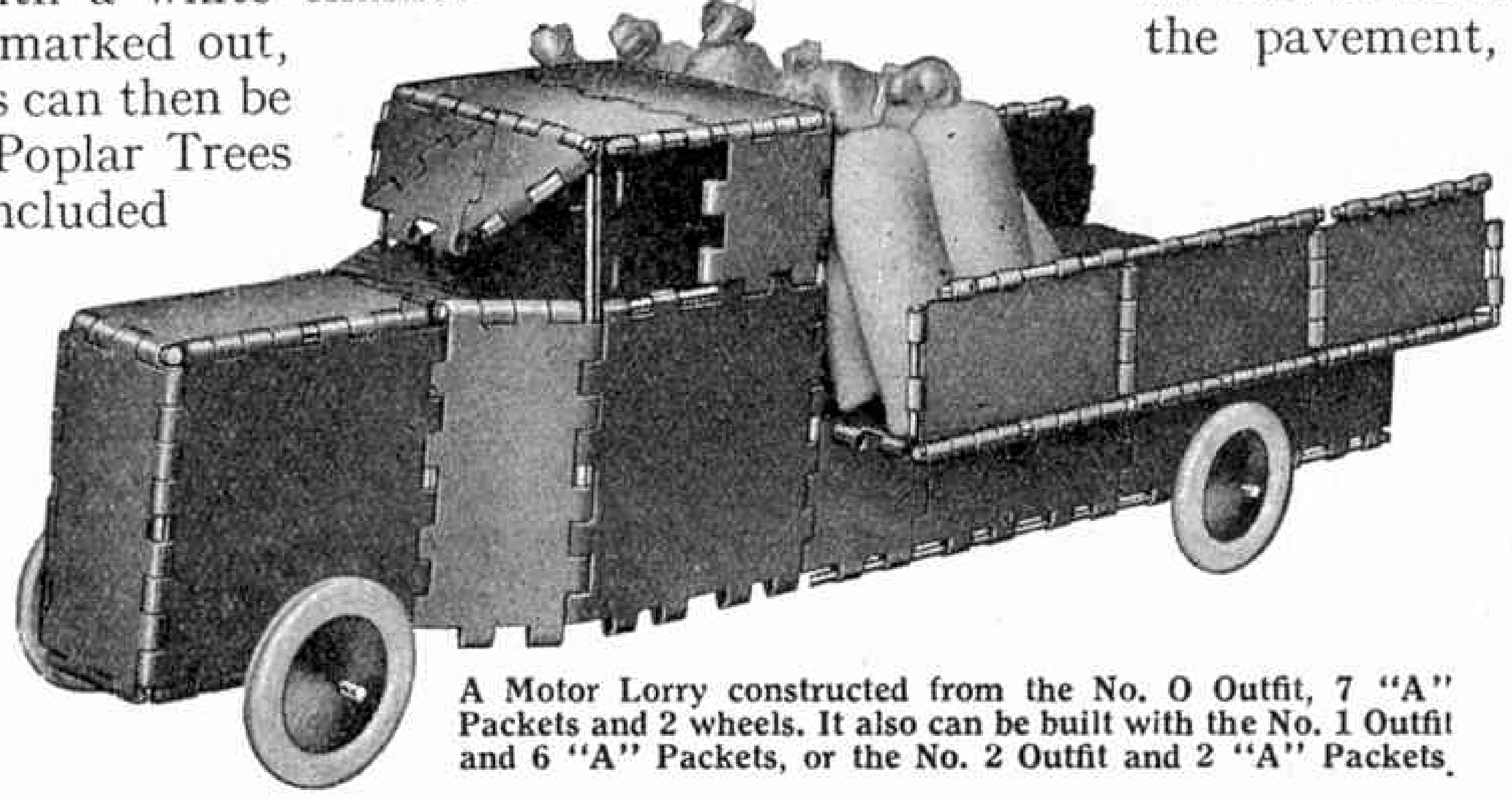
MODEL-BUILDING with Dinky Builder Outfits has been made more fascinating than ever by the introduction of a special Packet of parts to supplement the existing Outfits. This is known as the Dinky Builder "A" Packet. One or more Packets can be added to any Outfit in order to increase its scope, and by this means the enthusiast can increase the size of his Outfit step by step, so that he can make bigger and better models.



Aeroplane Hangar built with the No. 2 Meccano Dinky Builder Outfit to which 12 "A" Packets have been added.

A special Dinky Builder Super Model Leaflet has now been introduced in order to show the possibilities of Outfits extended by the addition of Dinky Builder "A" Packets. The price of this leaflet is 1½d., post free, and among the super models described and illustrated in it are a Tipping Motor Lorry, a Liner, a Monoplane, and buildings of all kinds, including a Castle and various Churches. An excellent idea of these fascinating super models is conveyed by the four reproduced on these pages. The Garage shown in the upper illustration on the opposite page, or the Motor Bus seen in the lower illustration opposite, can be built by the owner of a No. 2 Outfit who adds one "A" Packet to his stock of parts. Two "A" Packets provide him with the additional parts required to build the Lorry illustrated on this page, and the Aeroplane Hangar shown in the upper illustration on this page is a somewhat larger model that can be built from a No. 2 Outfit and 12 "A" Packets.

Owners of Dinky Builder Outfits will find that Dinky Toys can be used to add new thrills to the fun provided by these realistic miniatures, and the accompanying illustrations show how the two hobbies can be combined for this purpose. For instance, the Aeroplane Hangar becomes much more attractive when Dinky Toy Aeroplanes are housed in it, especially if the model forms part of an aerodrome. A landing ground with a white chalked circle in the centre is easily marked out, and fences or hedges and trees can then be added in suitable positions. Poplar Trees and Stands to hold them are included in the Dinky Builder range of parts and can be obtained separately; fences can be improvised from narrow strips of wood, but it is more satisfactory to use the lengths of fencing and hedging included in the Hornby System.



A Motor Lorry constructed from the No. 0 Outfit, 7 "A" Packets and 2 wheels. It also can be built with the No. 1 Outfit and 6 "A" Packets, or the No. 2 Outfit and 2 "A" Packets.

A strip of paper or cardboard can be used to mark out a road leading to the Hangar, and along this road can be run Dinky Toy Commercial Vehicles and Motor Cars and Motor Buses. These accessories give a life-like effect to the complete layout by adding an interesting suggestion of the activity and bustle that characterises an actual aerodrome as the aeroplanes arrive and depart.

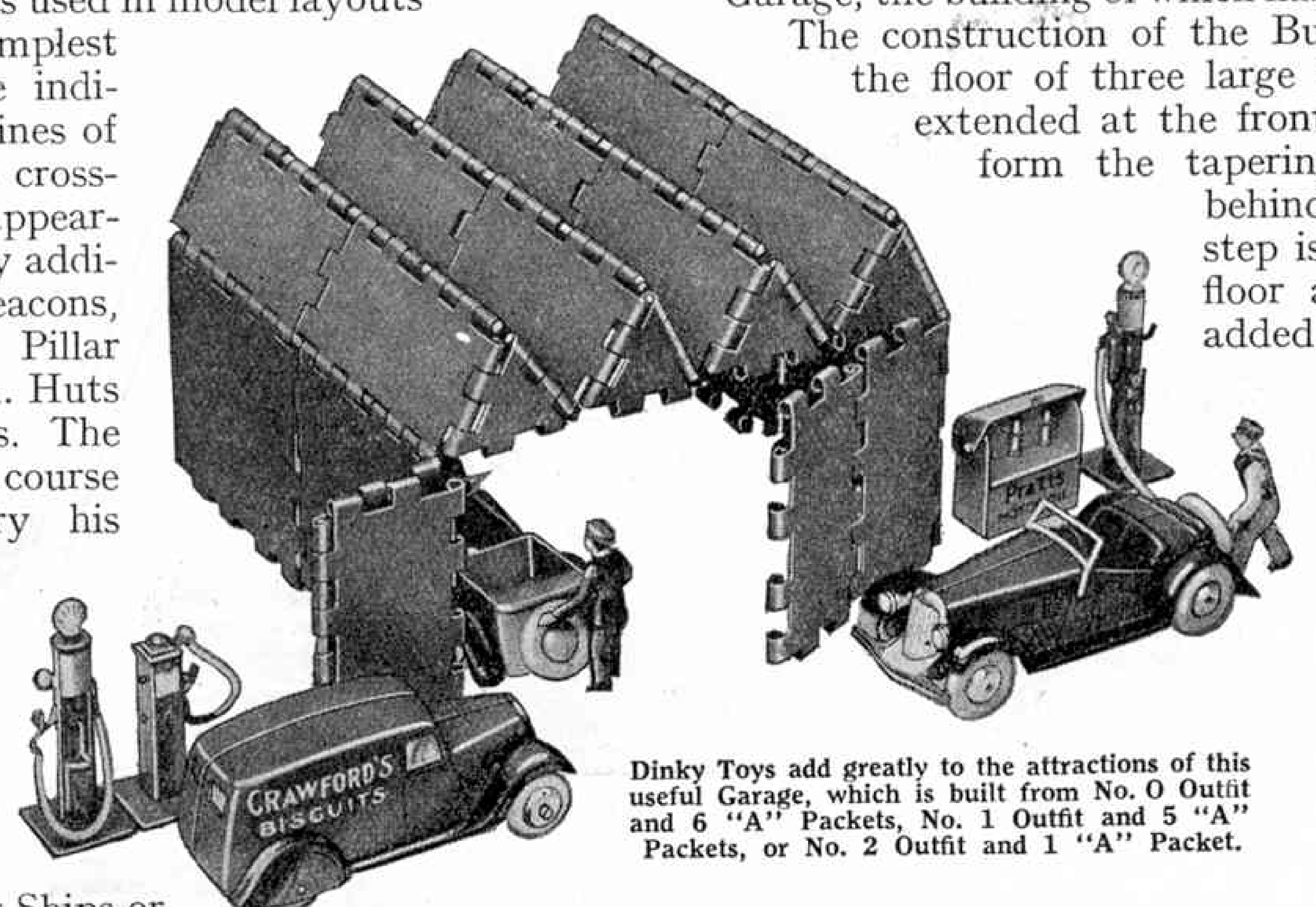
When building the Aeroplane Hangar, the tower should be made up first. A large Square is fixed at the back of the tower, and the remainder of the roof is then added on each side before the rest of the structure is built. The four doors open outward and each is made of two Oblongs hinged together so that they fold back in the positions shown. Three Oblongs form the central entrance, and this is roofed with three small Squares and three Triangles. The sides of the porch so formed are attached to Oblongs at the front of the model, and the same Oblongs support the inner pairs of doors. A Triangle mounted on a Rod at one corner of the model represents the wind stocking that indicates to pilots the direction of the wind.

Owners of Dinky Toy motor vehicles naturally require garages. An excellent model Garage is shown in the Instruction Leaflet for Outfits 1 and 2, and a much larger one is illustrated on the opposite page. This is equipped with Petrol Pumps and Oil Bin, and represents a typical roadside filling station, with a garage for repair work. Members of the Dinky Toy Engineering Staff (No. 4) are used for attendants and the equipment should include one of the new Breakdown Cars (No. 30e). A Petrol Tank Wagon (No. 25d) of course will be used for making periodic calls to replenish the "tanks." In arranging the roadway it can be made to run directly across the front of the building, allowing room for a pavement, but the more usual arrangement is to set the garage back from the road, leaving space for cars to be driven off the road and behind the pavement, so that no obstruction is caused while they are filling up.

Buildings similar in construction to this garage can be used as sheds for Dinky Toy Commercial Vehicles (No. 25) or as depots for Tramcars (No. 27) or Motor Buses (No. 29), and larger sheds can be built on the same lines if the Outfit is extended further by adding extra

"A" Packets. The entire front of the model illustrated is made to open by fitting two double doors, each made of two Oblongs. An extension can be built at one side and provided with a shop front for the sale of accessories and equipment, or perhaps of refreshments.

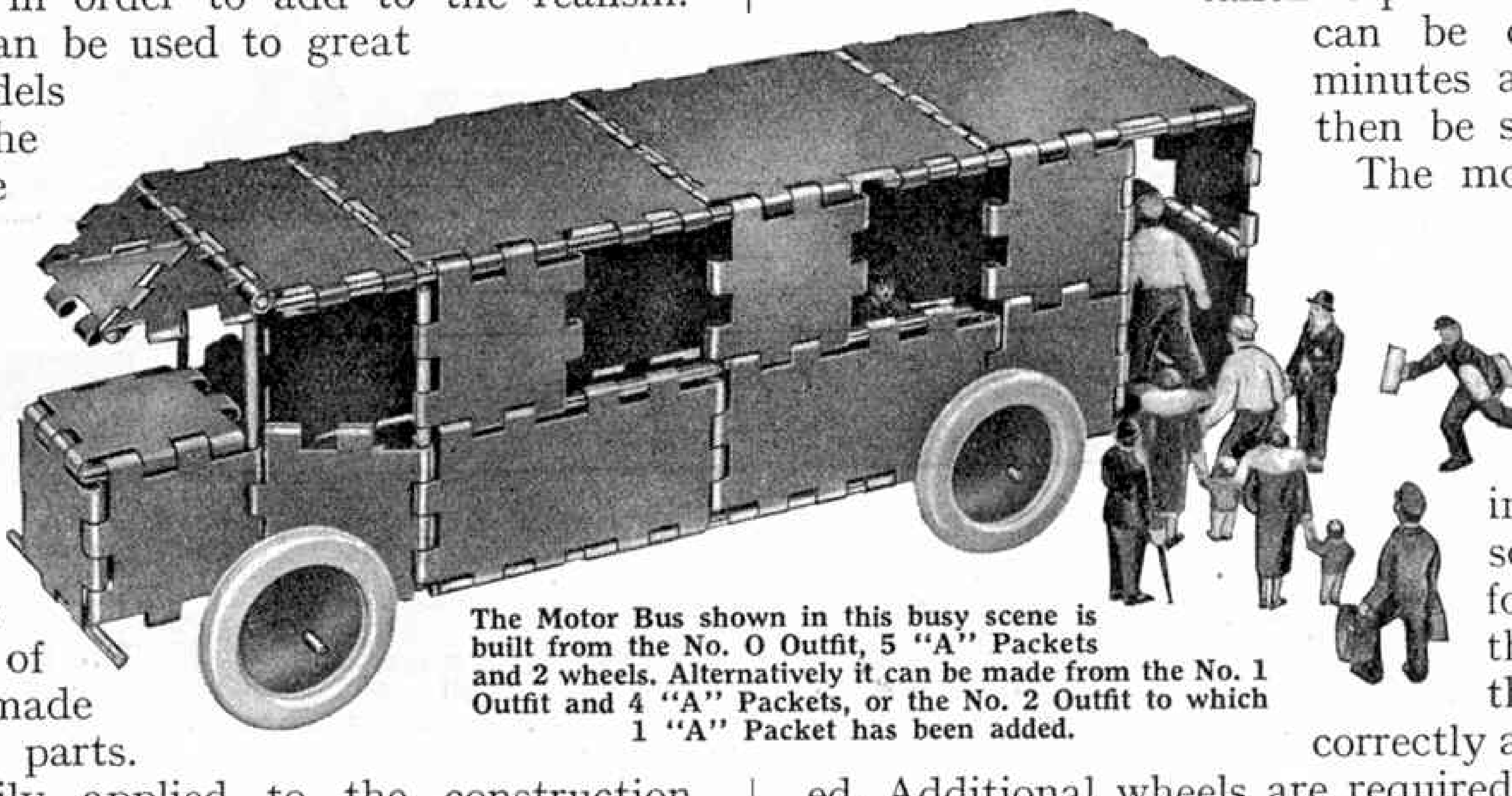
Much interesting amusement can be had by arranging roads for the Motor Vehicles used in model layouts of this kind. In their simplest form roads need only be indicated by marking the outlines of pavements and pedestrian crossings in chalk, but their appearance is greatly improved by additions such as the Belisha Beacons, Robot Traffic Signals, Pillar Boxes and R.A.C. and A.A. Huts of the Dinky Toy Series. The young road builder of course requires bridges to carry his highways over rivers and railways. Very good bridges can be erected with the aid of Dinky Builder Parts. These may be of different types and sizes, according to the requirements of the situation, and to see Dinky Toy Ships or Trains passing under them is a source of great satisfaction.



Dinky Toys add greatly to the attractions of this useful Garage, which is built from No. 0 Outfit and 6 "A" Packets, No. 1 Outfit and 5 "A" Packets, or No. 2 Outfit and 1 "A" Packet.

Dinky Builder Parts are particularly suitable for making railway accessories for the miniature Train Sets of the Dinky Toy range. Watchmen's and platelayer's huts, engine sheds, stations and signal cabins can be constructed without difficulty, and on increasing the stock of parts as required by adding the new "A" Packets a large number of structures of this kind can be built, forming practically a complete railway system. The track can be marked out in a similar manner to that already suggested for roads, and of course should be provided with fences and trees in order to add to the realism.

Dinky Toy figures can be used to great advantage with models similar in type to the Lorry shown in the lower illustration on the opposite page. Members of the Engineering and Station Staffs can be applied to loading and unloading operations, and the driver can be recruited from the same source. Road vehicles of many kinds can be made from Dinky Builder parts. These are most readily applied to the construction of motor lorries, and the examples given in the special Leaflet include a Tipping Lorry and a big Six-wheeled Lorry in addition to the model illustrated opposite. Other types also can be built, according to the ideas of the constructor and the range of parts available, and their design and construction usually offers little difficulty. In the model illustrated four large and eight small Squares are used for the platform body, the sides of which are formed from Oblongs. Two Oblongs fill in the back of the cab. All kinds of goods can be carried on the lorry, the load illustrated consisting of a number of Meccano Loaded Sacks (No. 122).



The Motor Bus shown in this busy scene is built from the No. 0 Outfit, 5 "A" Packets and 2 wheels. Alternatively it can be made from the No. 1 Outfit and 4 "A" Packets, or the No. 2 Outfit to which 1 "A" Packet has been added.

The Dinky Toy Passengers add much to the attraction of the model Motor Bus illustrated on this page, and their skilful use well illustrates the life-like realism that follows their employment. Another excellent example of their value for adding the finishing touches to a model is shown in the illustration on this page of the Dinky Builder Garage, the building of which has already been described.

The construction of the Bus is begun by making the floor of three large Squares, and these are extended at the front by three Triangles to form the tapering section immediately behind the bonnet. The next step is to fix the sides to the floor and finally the roof is added. An interesting feature is the addition of a Rod across the bottom of the radiator to form a bumper bar.

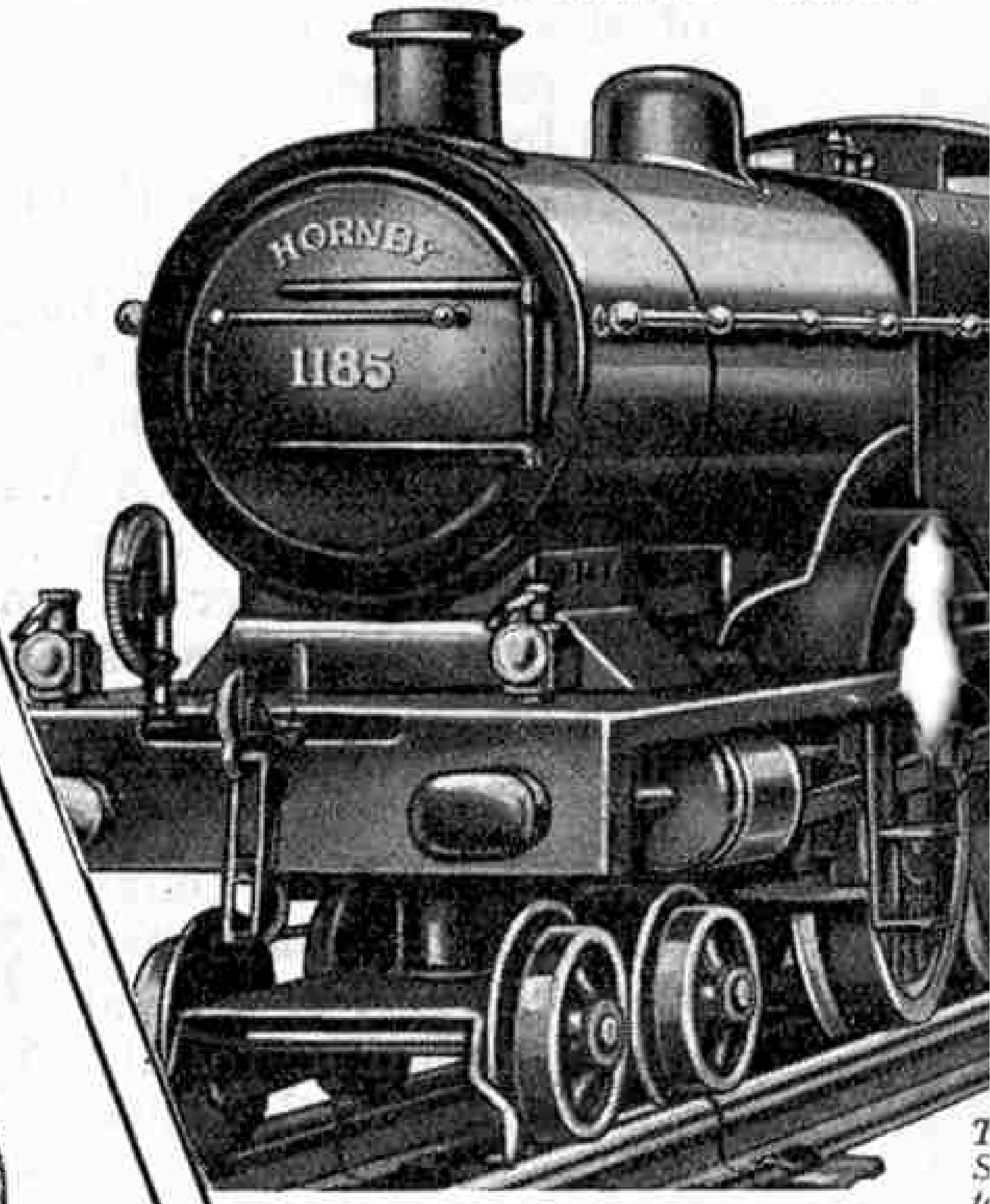
These models give some idea of the fun to be had from Dinky Builder Outfits when their scope is enlarged by adding "A" Packets. There is no limit to the range of new models that can be designed, and after making those shown in the Leaflet the model-maker will find it quite easy to design new models for himself. Ships, carts, aeroplanes, bridges and all kinds of buildings are but a few of the subjects of which excellent models can be made. Larger and more elaborate models can be made as more "A" Packets are added to the Outfit and some really imposing structures can then be built. One of the greatest attractions of Dinky Builder models is their simplicity, for the construction of the largest of these requires little more skill than building the small ones. Another feature is the speed with which models can be taken to pieces. Even quite big models can be dismantled in a few minutes and a new model can then be started right away.

The model-builder who adds "A" Packets to his Outfit will find that he can build several small models at the same time. For instance, the different sets of furniture shown for the No. 2 Outfit can then be built at once, so that the "house" can be correctly and completely furnished. Additional wheels are required when several wheeled vehicles are to be built. These can be bought separately, as in the case of all Dinky Builder parts, and when this is done it is easy to make a fleet of small lorries and trucks, such as those shown in the Instructions for Outfit 1, and to use these vehicles for transporting small loads. The extra wheels obtained for these models also will be found useful when making larger lorries and trailers, six-wheeled lorries, and similar models.

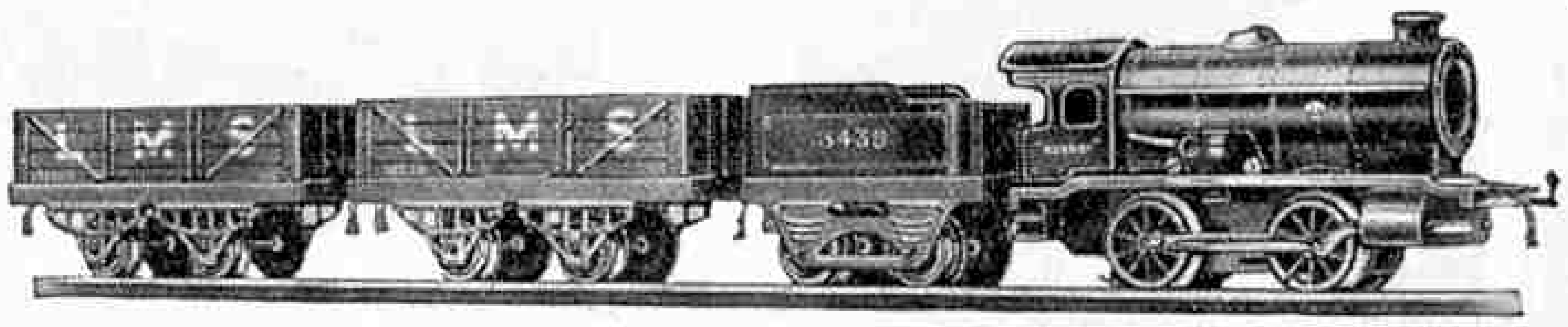
In building new models a little thought should be given to the arrangement of the colours. The different parts should not be built into the model in a haphazard manner, but should be placed so that the colours harmonise.

HORNBY BRITIS
GUARA

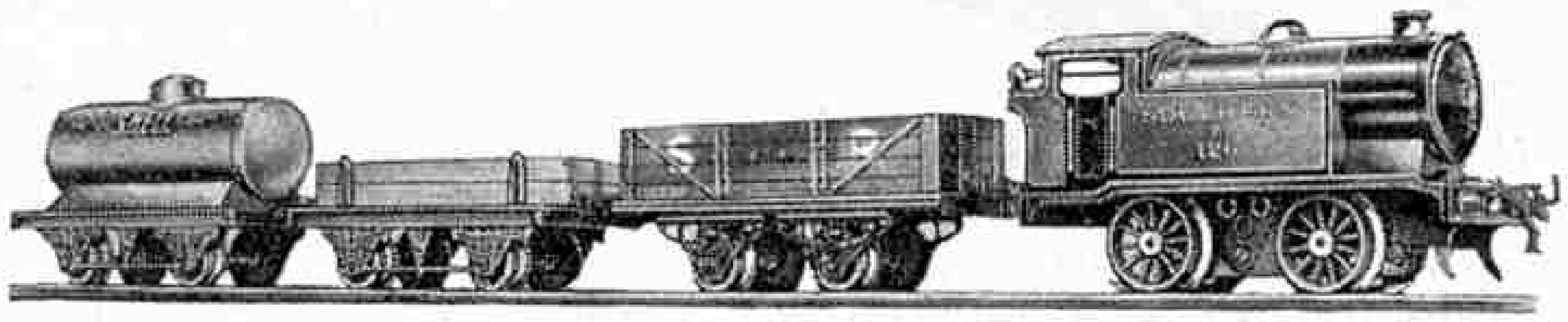
ELECTRIC AND



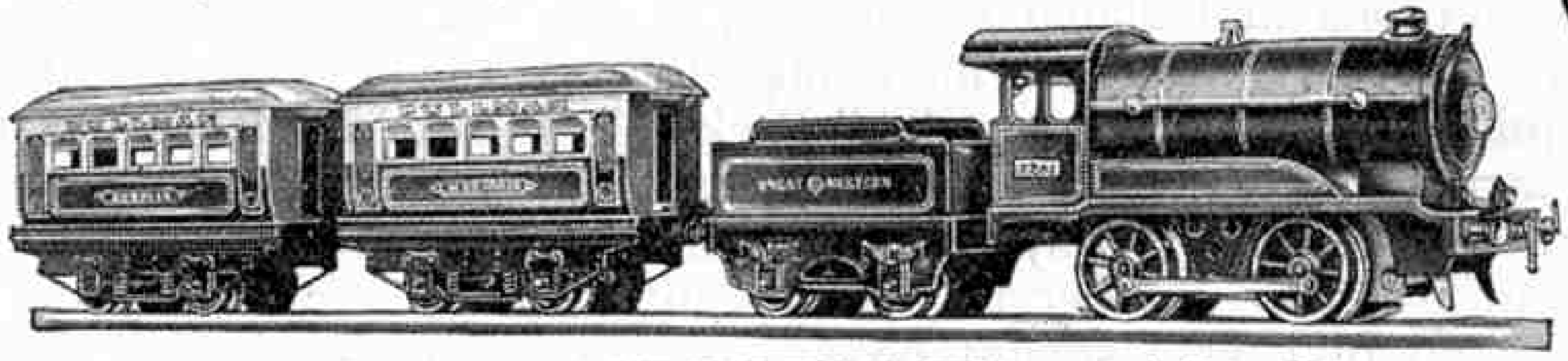
A Selection of HORNBY ELECTRIC TRAIN SETS (20 volt and 6 volt)



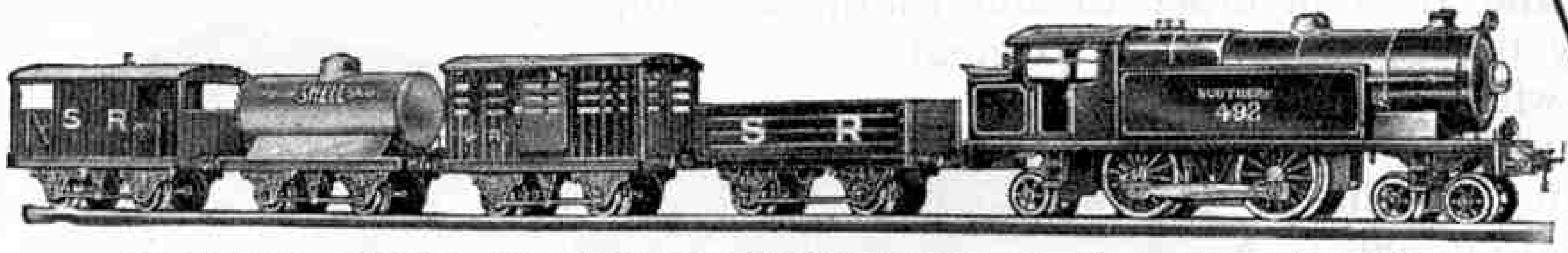
EM120 (20 volt) or EM16 (6 volt) GOODS TRAIN SET (non-reversing). Price **15/-**



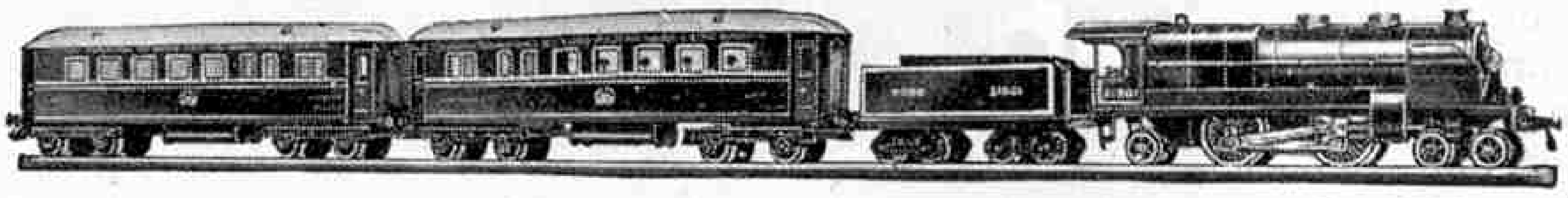
EM320 (20 volt) or EM36 (6 volt) TANK GOODS TRAIN SET (reversing). Price **24/-**



HORNBY No EO20 (20 volt) PASSENGER TRAIN SET (reversing). Price **30/-**

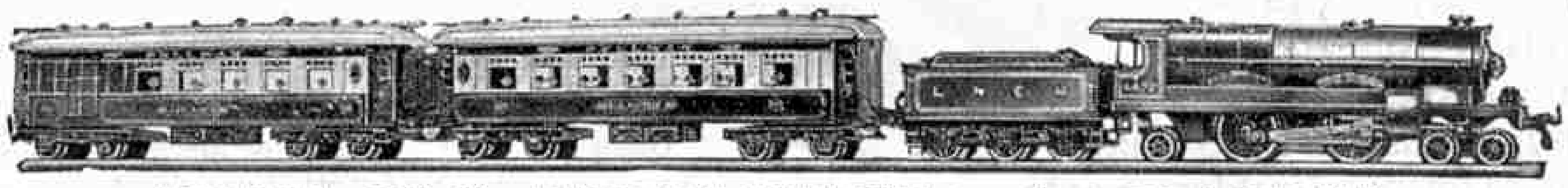


HORNBY No. E220 (20 volt) MIXED GOODS TRAIN SET (automatic reversing). Price **47/6**



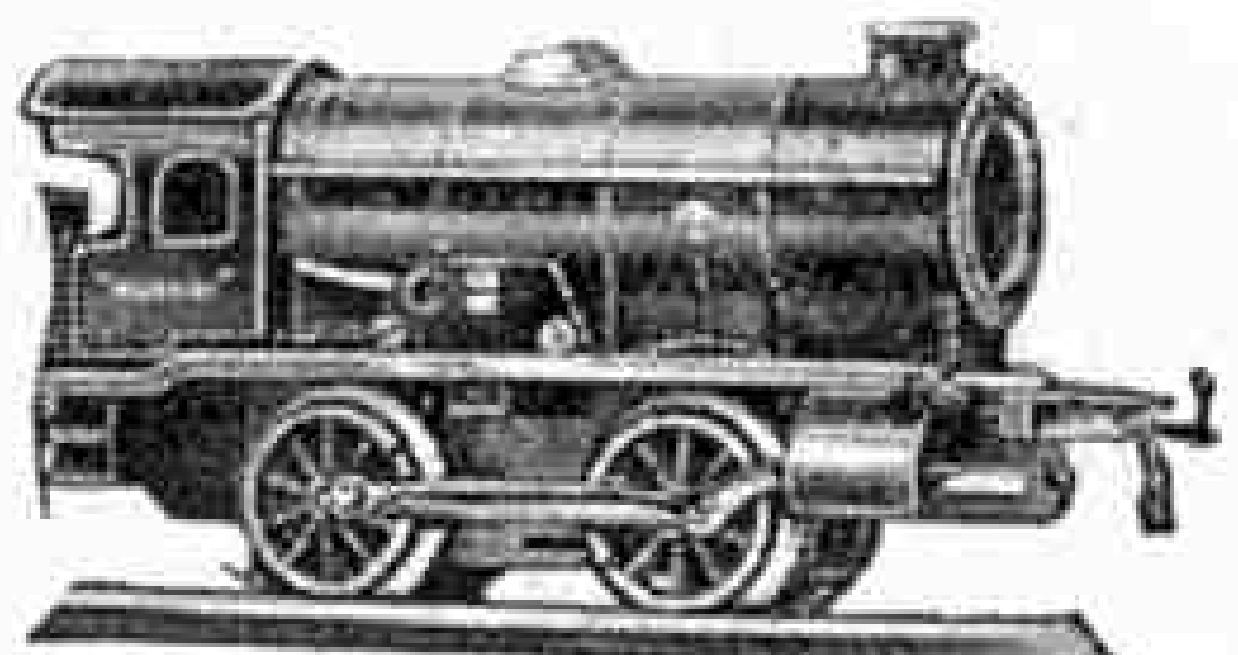
HORNBY No. E320 (20 volt) RIVIERA "BLUE" TRAIN SET (automatic reversing). Price **67/6**

PRODUCT of MECCANO LIMITED LIVERPOOL

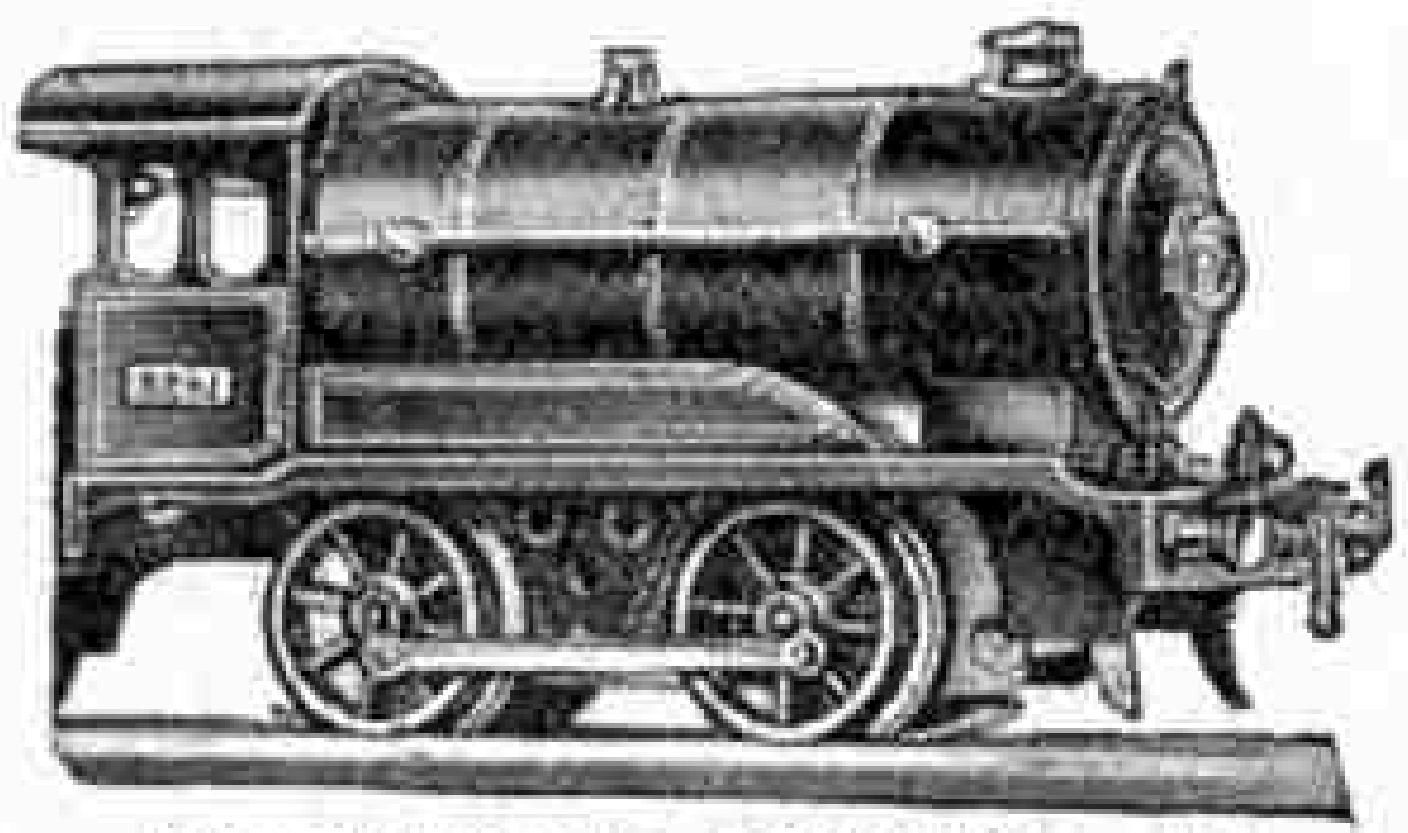


HORNBY No. E320 (20 volt) PULLMAN TRAIN SET (automatic reversing). Price **72/6**

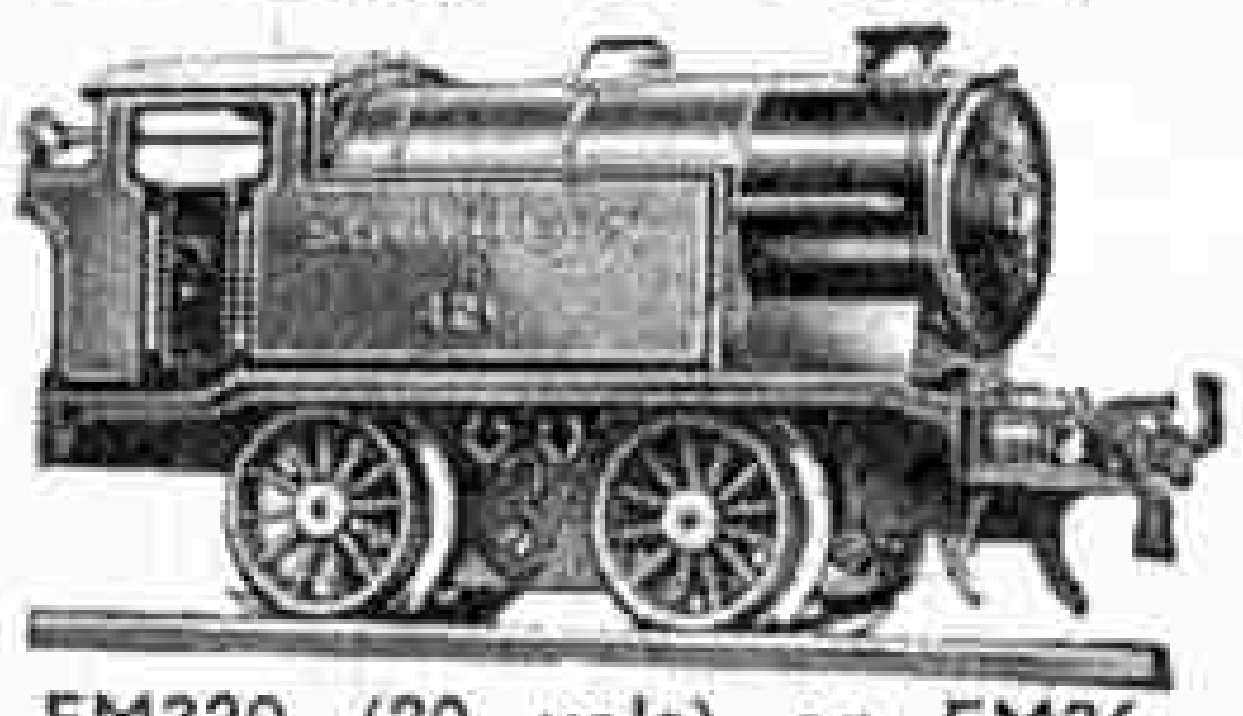
A selection of HORNBY ELECTRIC LOCOMOTIVES (20 volt and 6 volt)



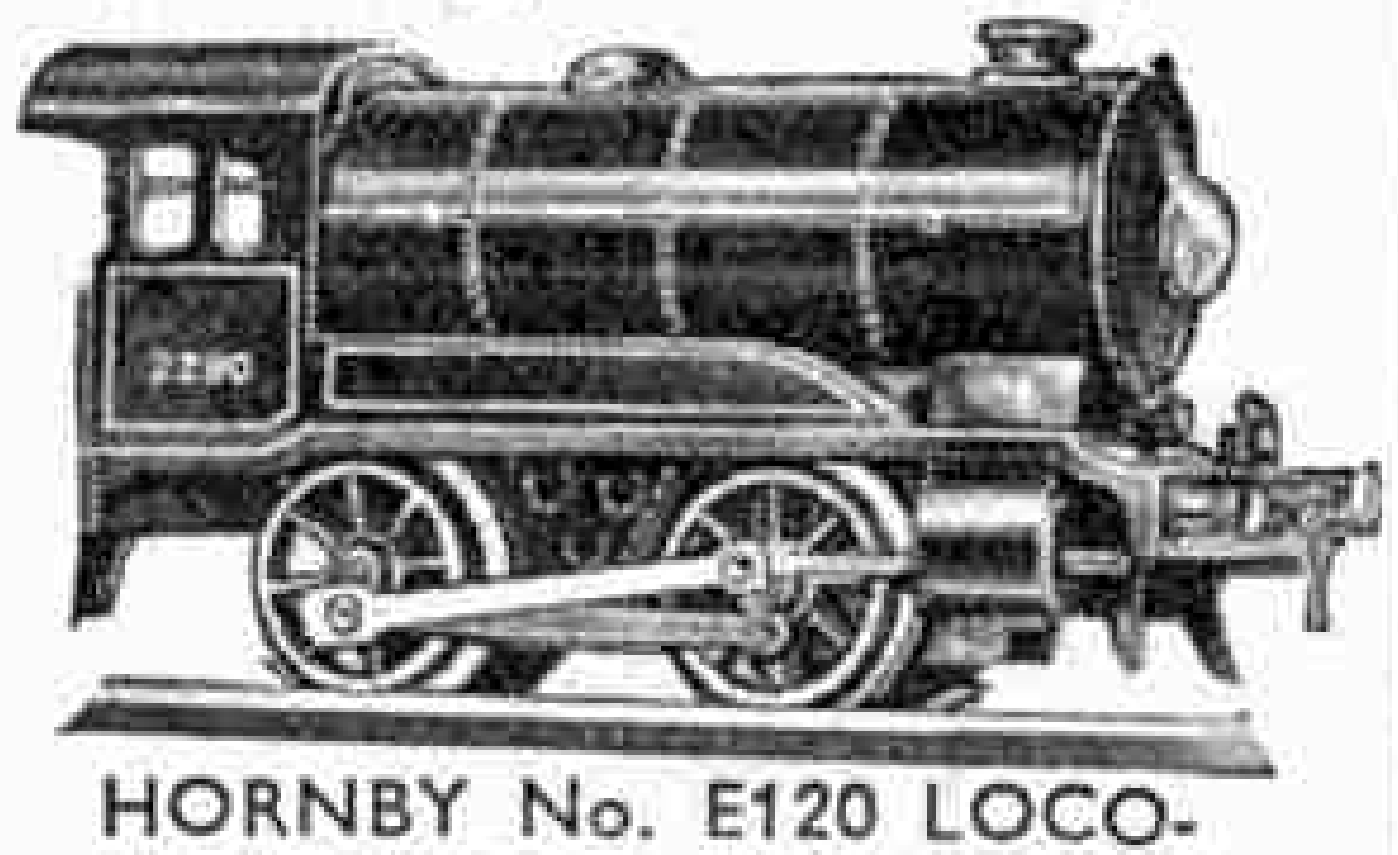
EM120 (20 volt) or EM16 (6 volt) LOCOMOTIVE (Non-reversing) ... Price **8/6**



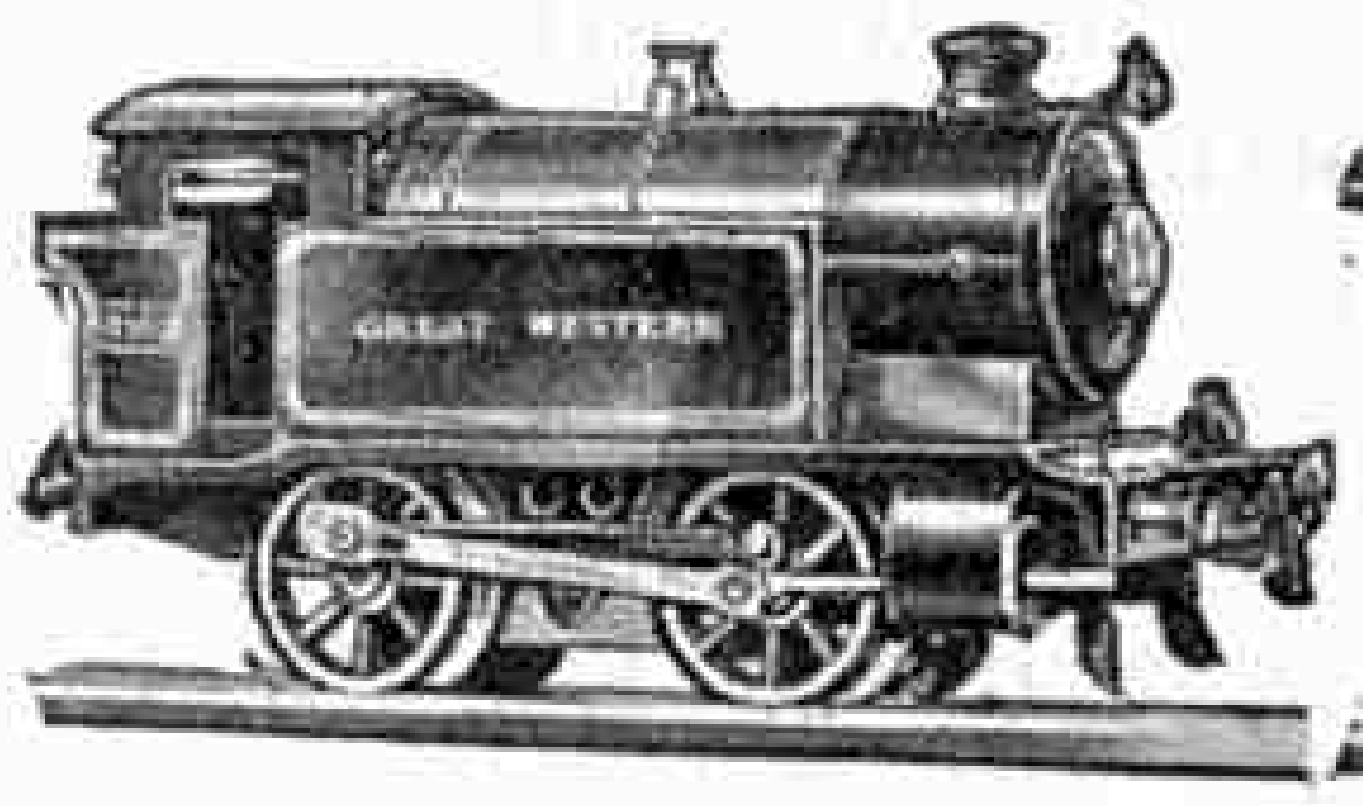
HORNBY No. EO20 (20 volt) LOCOMOTIVE (Reversing) ... Price **22/-**



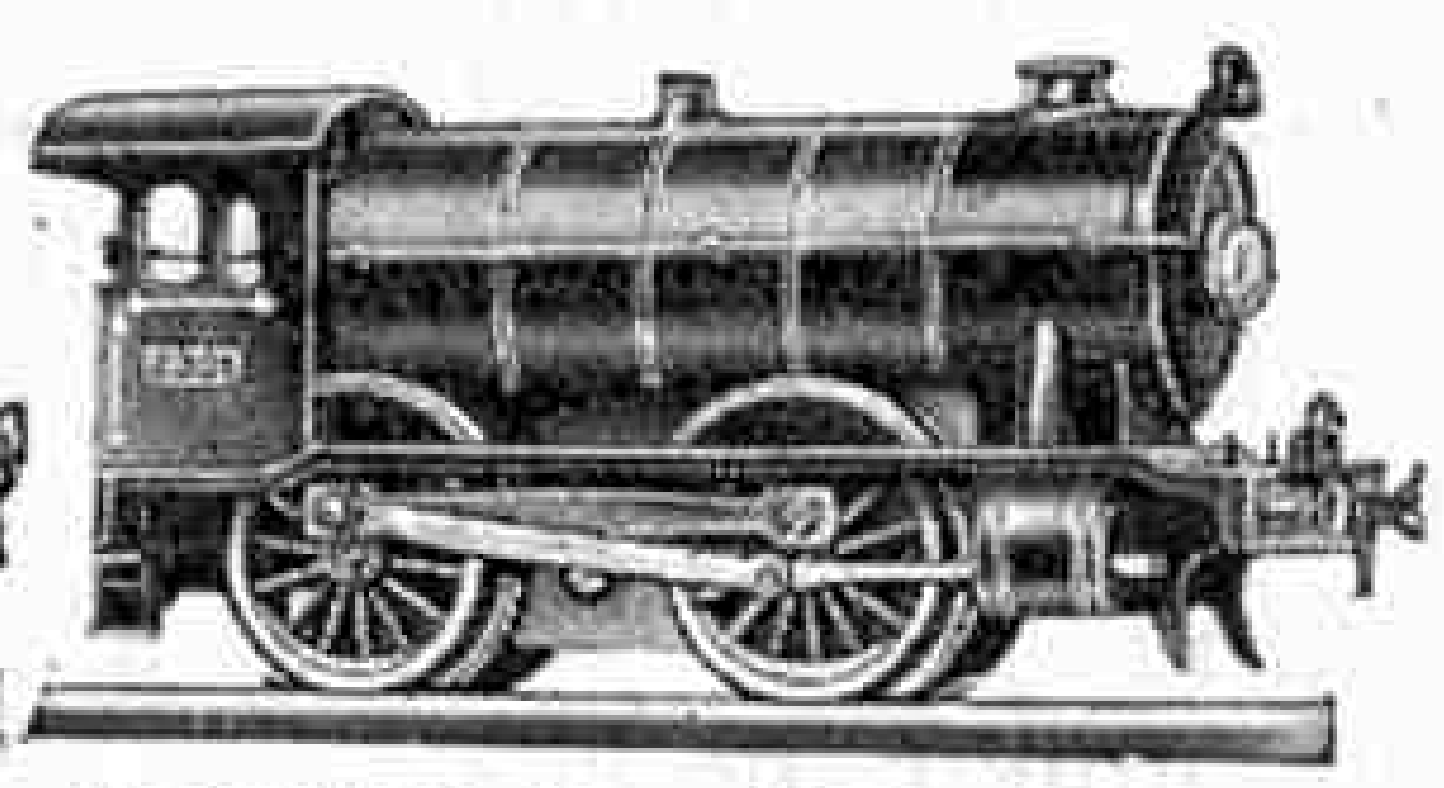
EM320 (20 volt) or EM36 (6 volt) TANK LOCOMOTIVE (Reversing) ... Price **16/6**



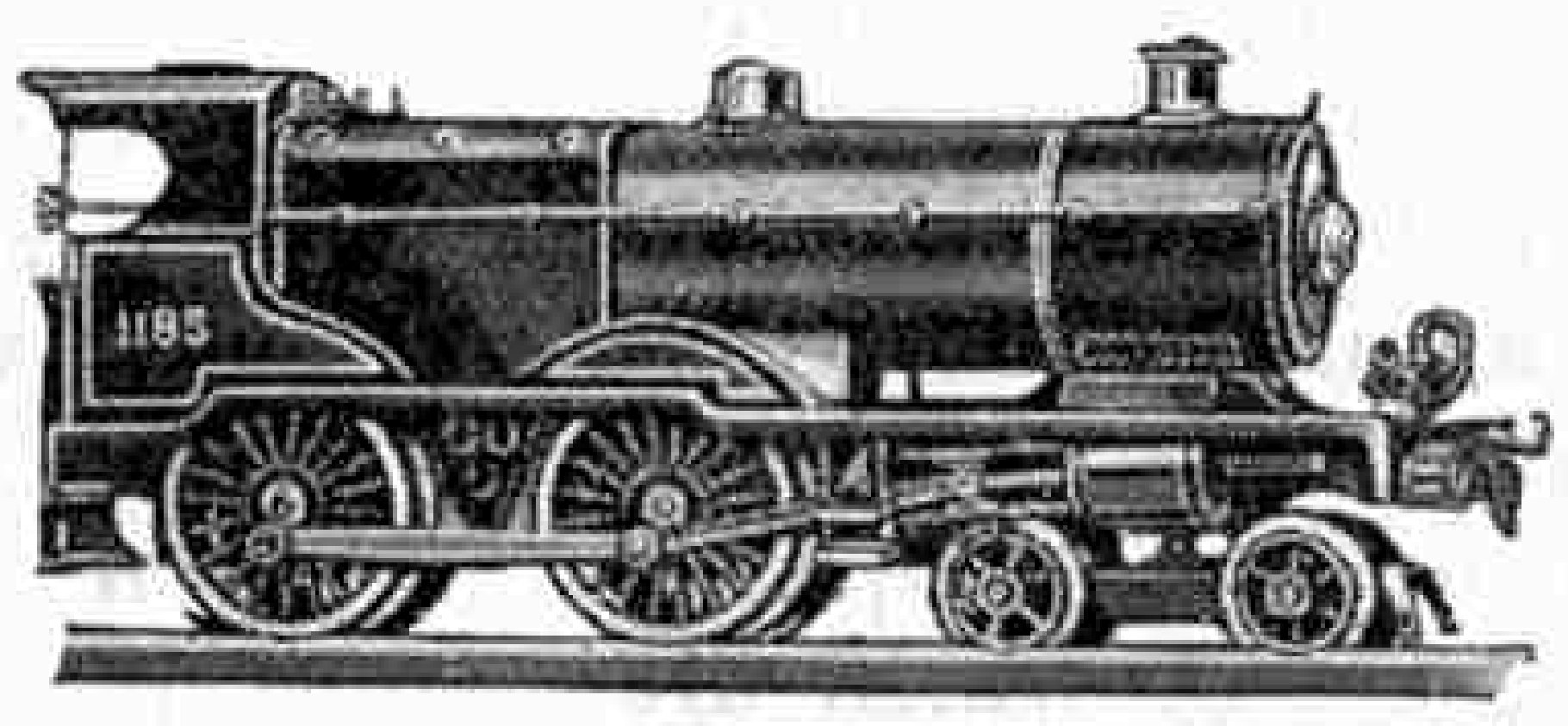
HORNBY No. E120 LOCOMOTIVE (20 volt) (Reversing) ... Price **24/-**



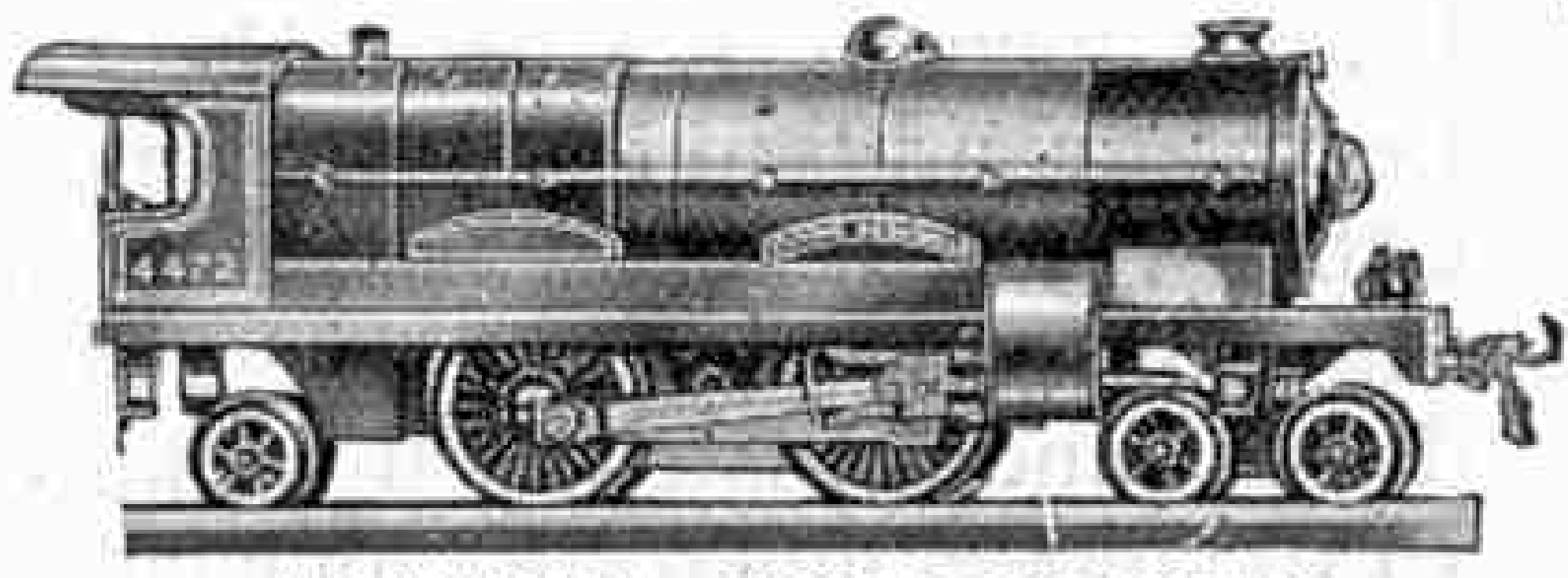
HORNBY No. E120 (20 volt) or E16 (6 volt) TANK LOCOMOTIVE (Reversing) ... Price **24/-**



HORNBY No. E120 SPECIAL LOCOMOTIVE (20 volt) (Automatic reversing). Price **30/-**



HORNBY No. E220 SPECIAL LOCOMOTIVE (Automatic reversing) ... Price **37/6**



HORNBY No. E320 LOCOMOTIVE (Automatic reversing) ... Price **35/-**

Perfect Miniatur

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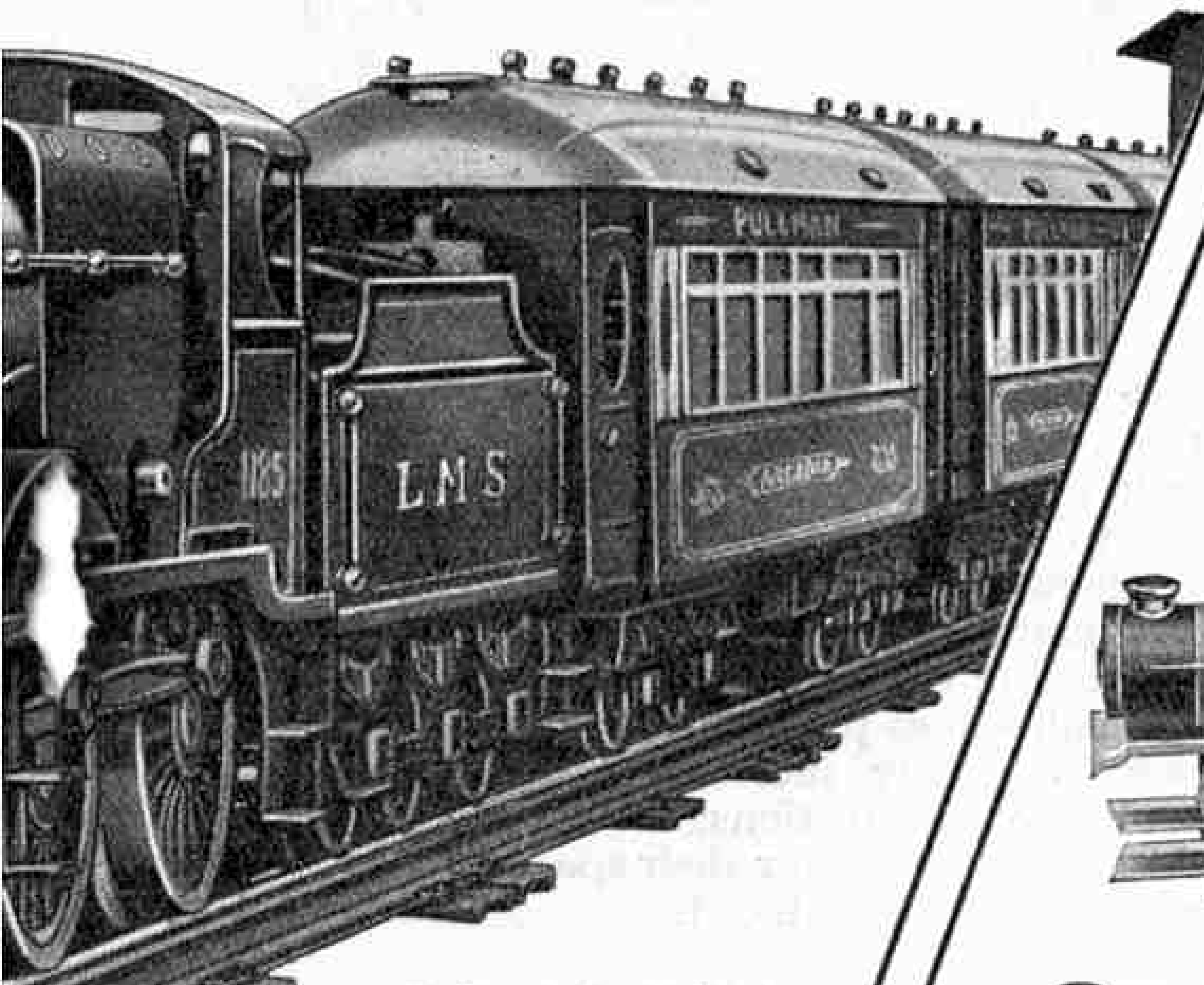

An illustration of a Hornby No. 2 Special Train Set, hauled by a Hornby No. 2 Special Locomotive, the latter a true-to-type model of the real L.M.S.R. Standard Compound Locomotive.

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cause they enable almost every
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Hornby Locomotives are
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heavy loads. The Hornby
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with a low consumption
e 20-volt Locomotives
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All Hornby Electric
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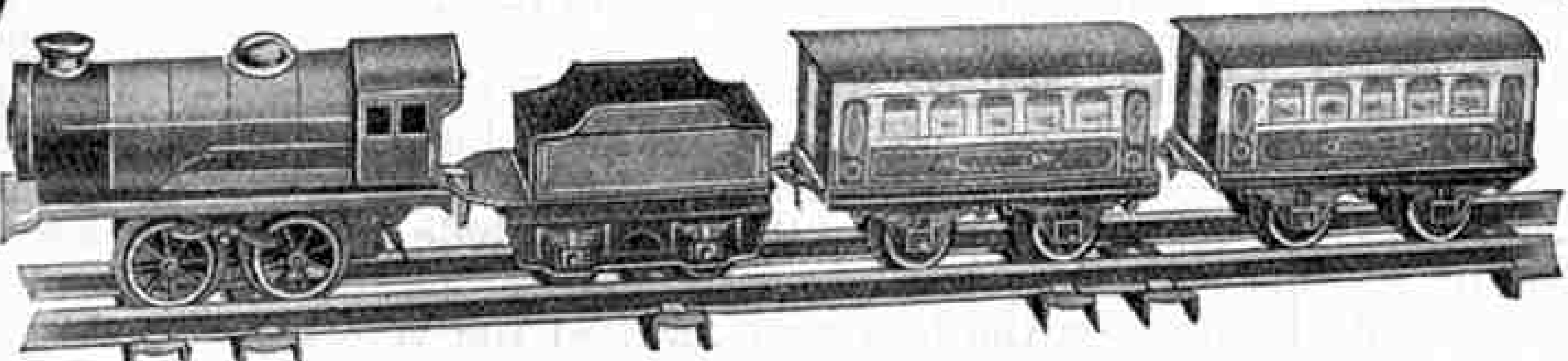
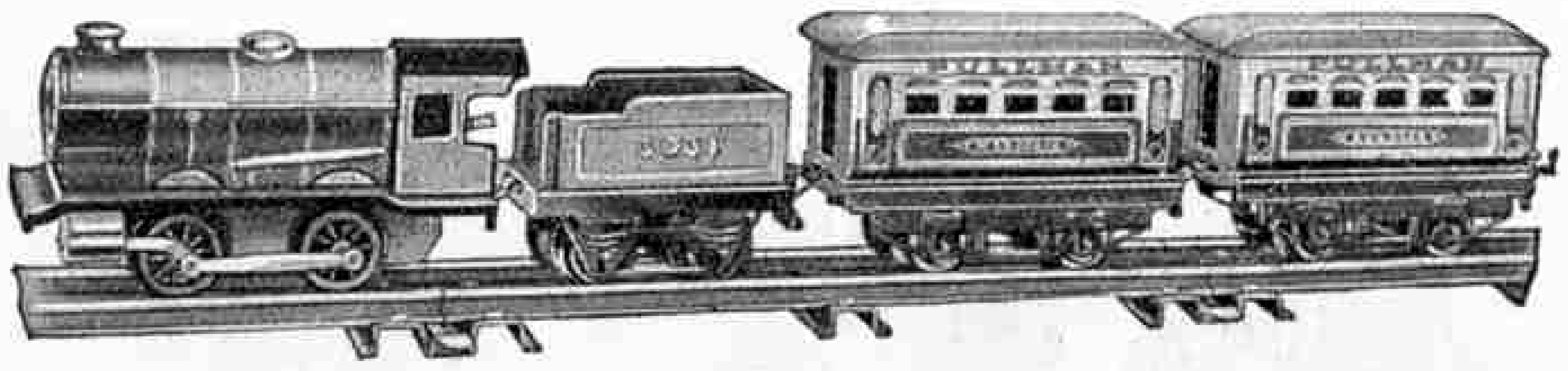
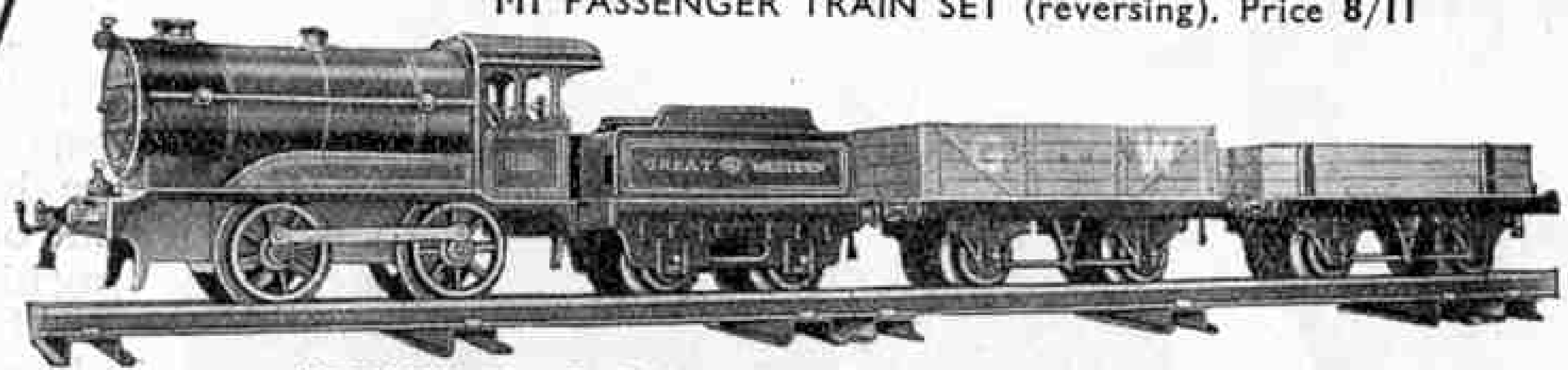
A Selection of HORNBY CLOCKWORK TRAIN SETS



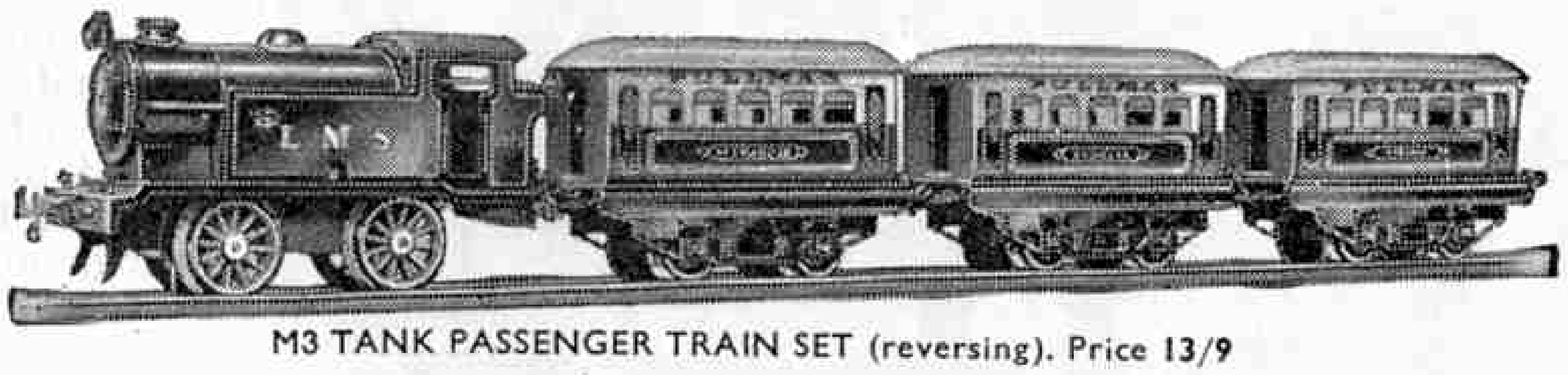
MO PASSENGER TRAIN SET (non-reversing). Price **5/6**



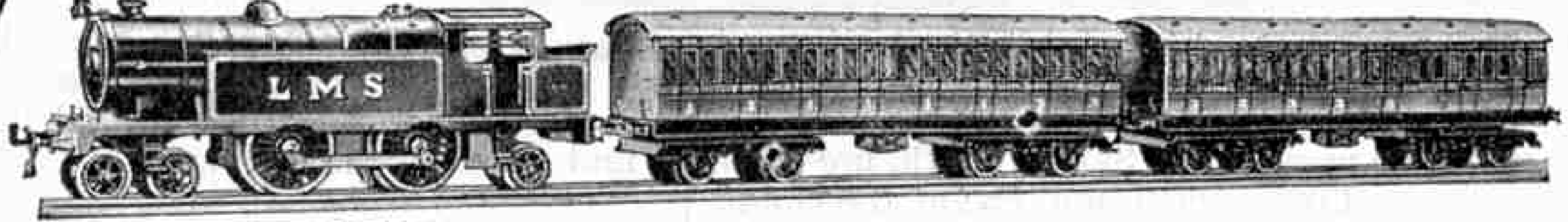
M1 PASSENGER TRAIN SET (reversing). Price **8/11**



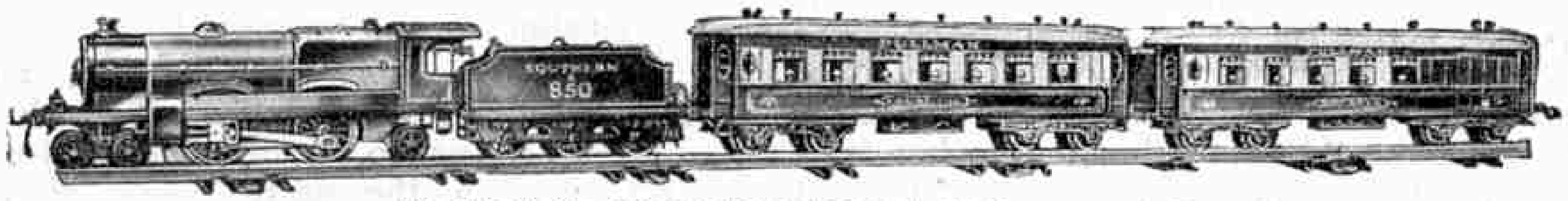
HORNBY No. O GOODS TRAIN SET (reversing). Price **17/6**



M3 TANK PASSENGER TRAIN SET (reversing). Price **13/9**



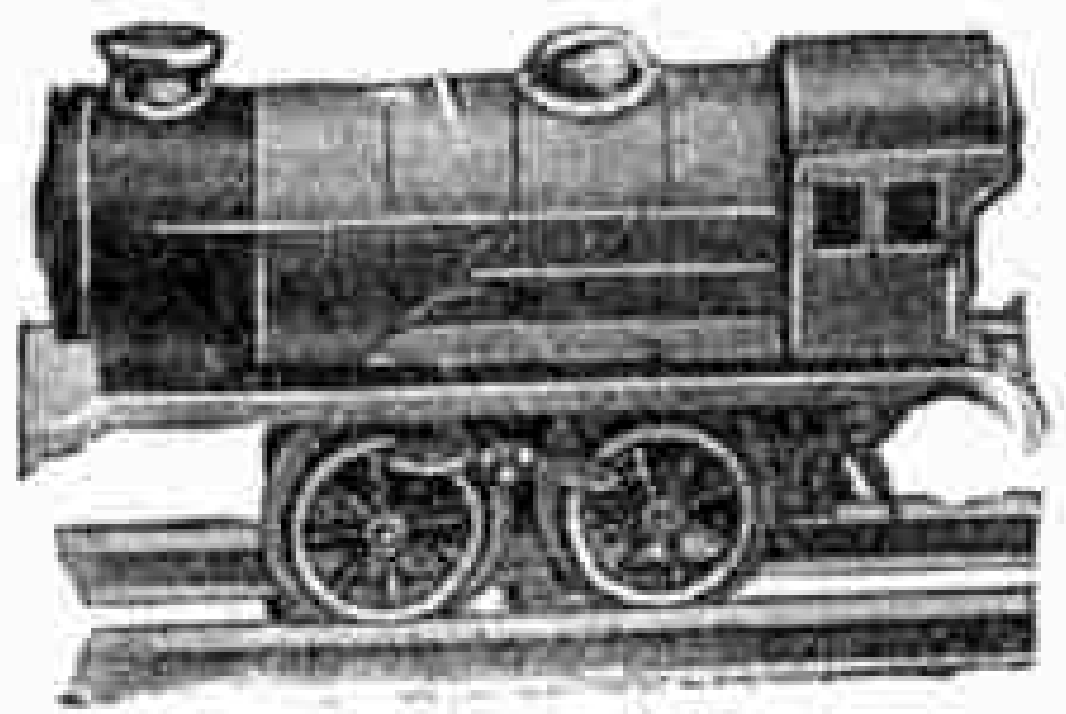
HORNBY No. 2 TANK PASSENGER TRAIN SET (reversing). Price **40/-**



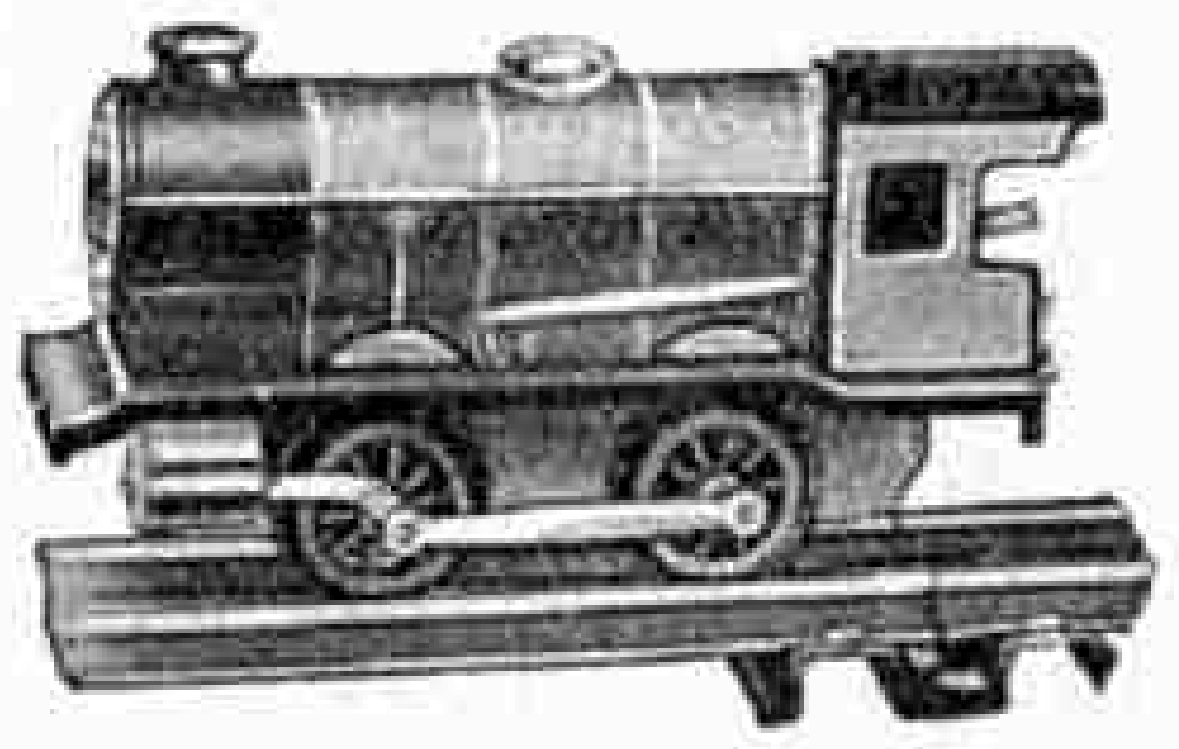
HORNBY No. 3C PULLMAN TRAIN SET (reversing). Price **62/6**

PRODUCT of MECCANO LIMITED LIVERPOOL

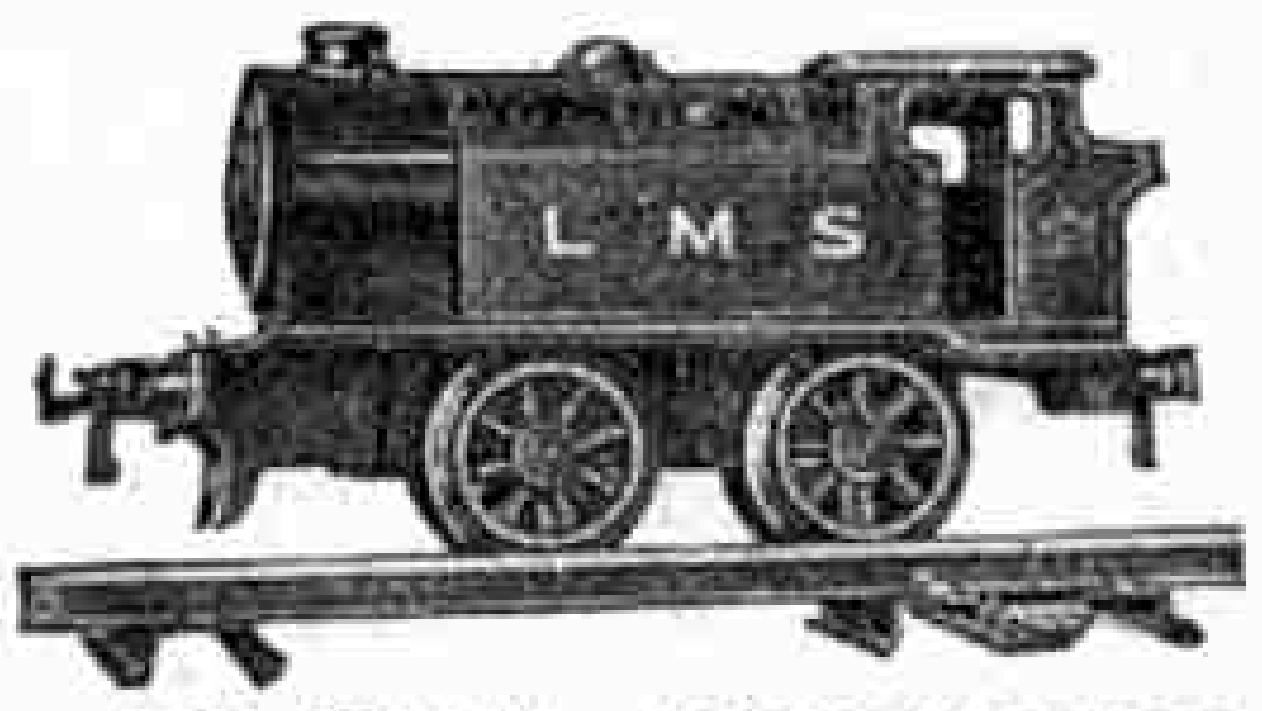
A selection of HORNBY CLOCKWORK LOCOMOTIVES



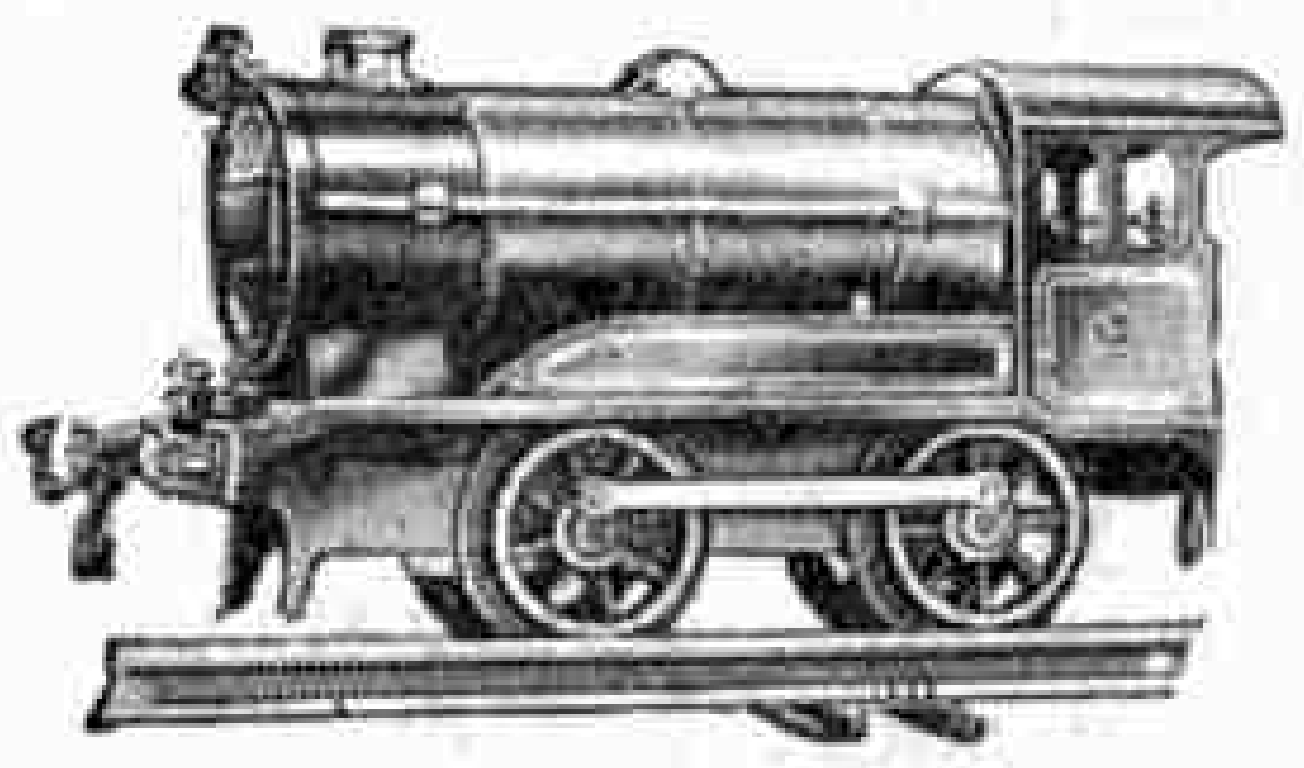
MO LOCOMOTIVE
(Non-reversing) ... Price **2/9**



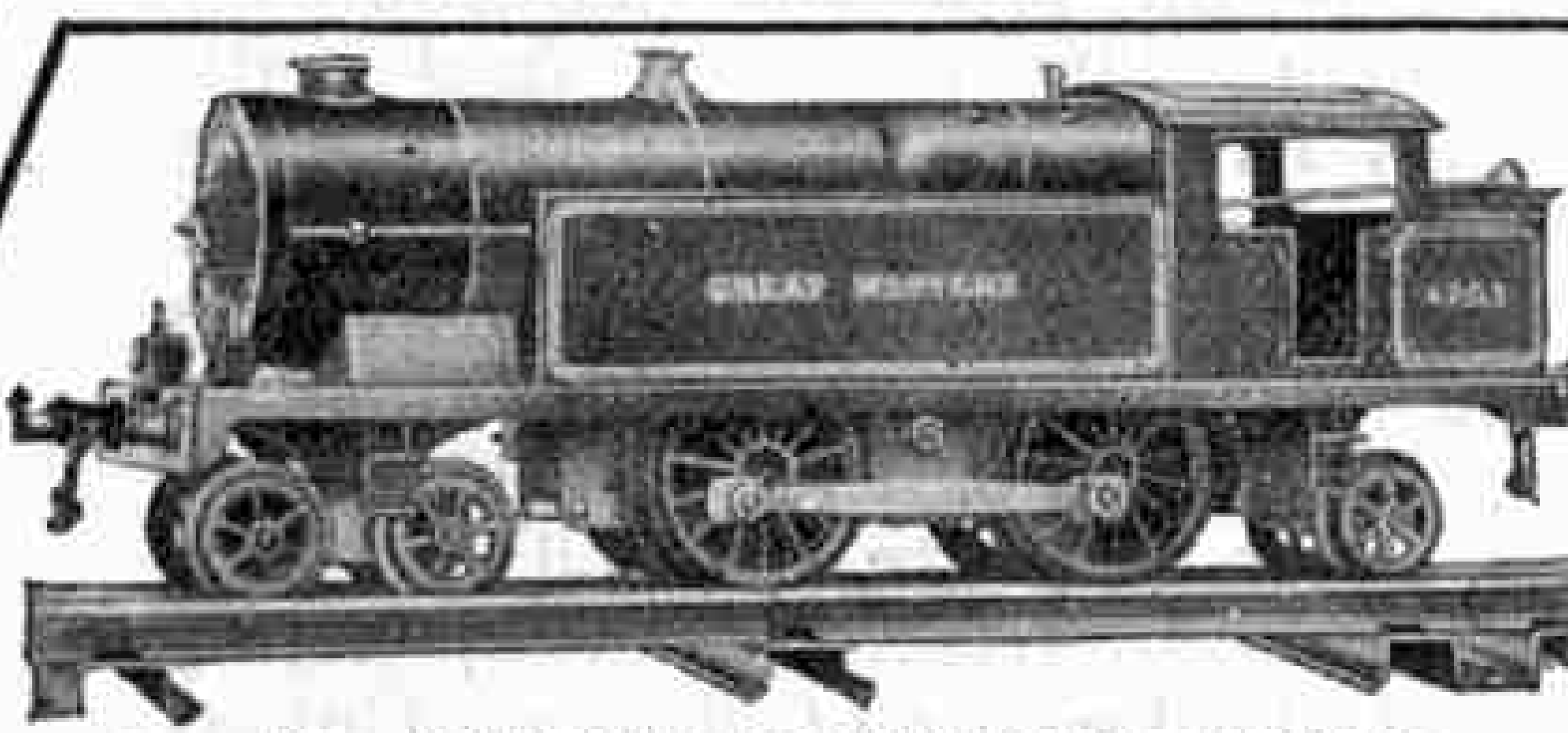
MI/2 LOCOMOTIVE
(Reversing) ... Price **4/6**



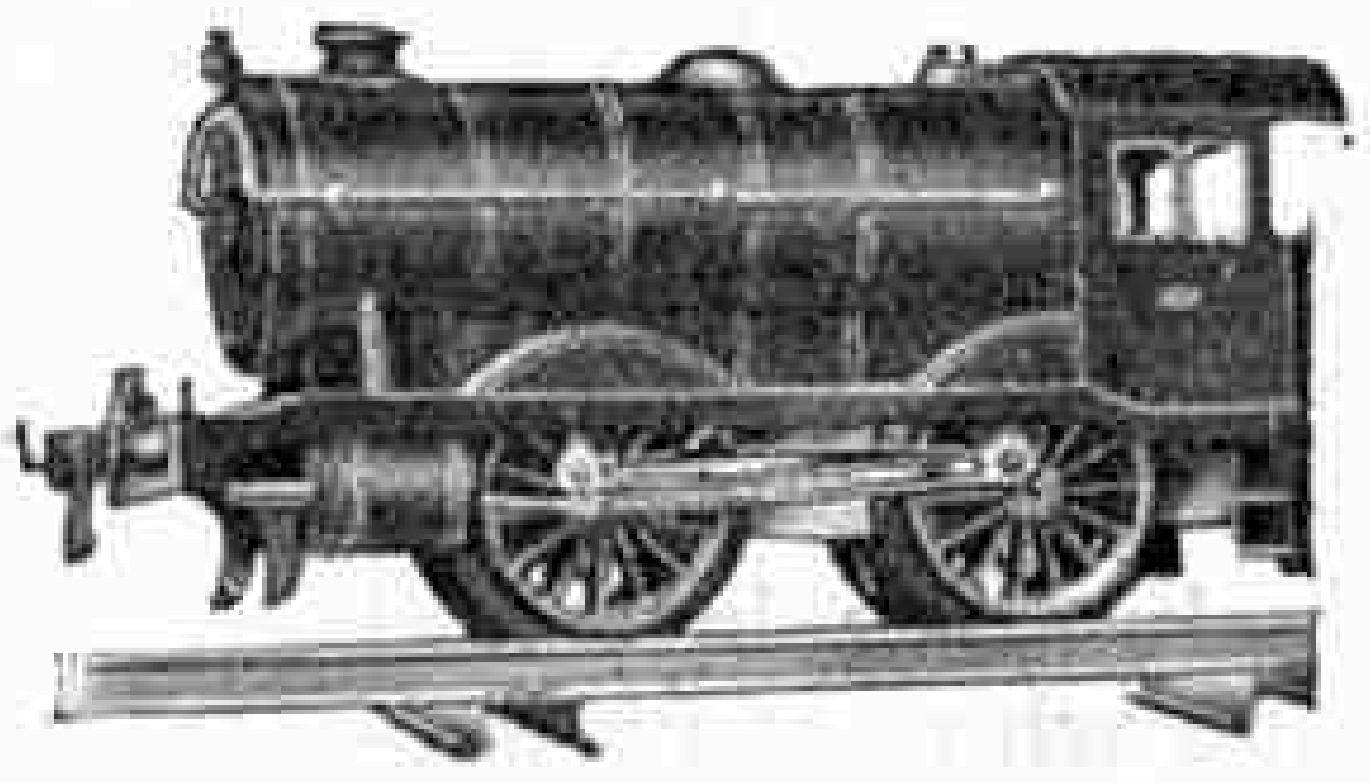
M3 TANK LOCOMOTIVE
(Reversing) ... Price **7/6**



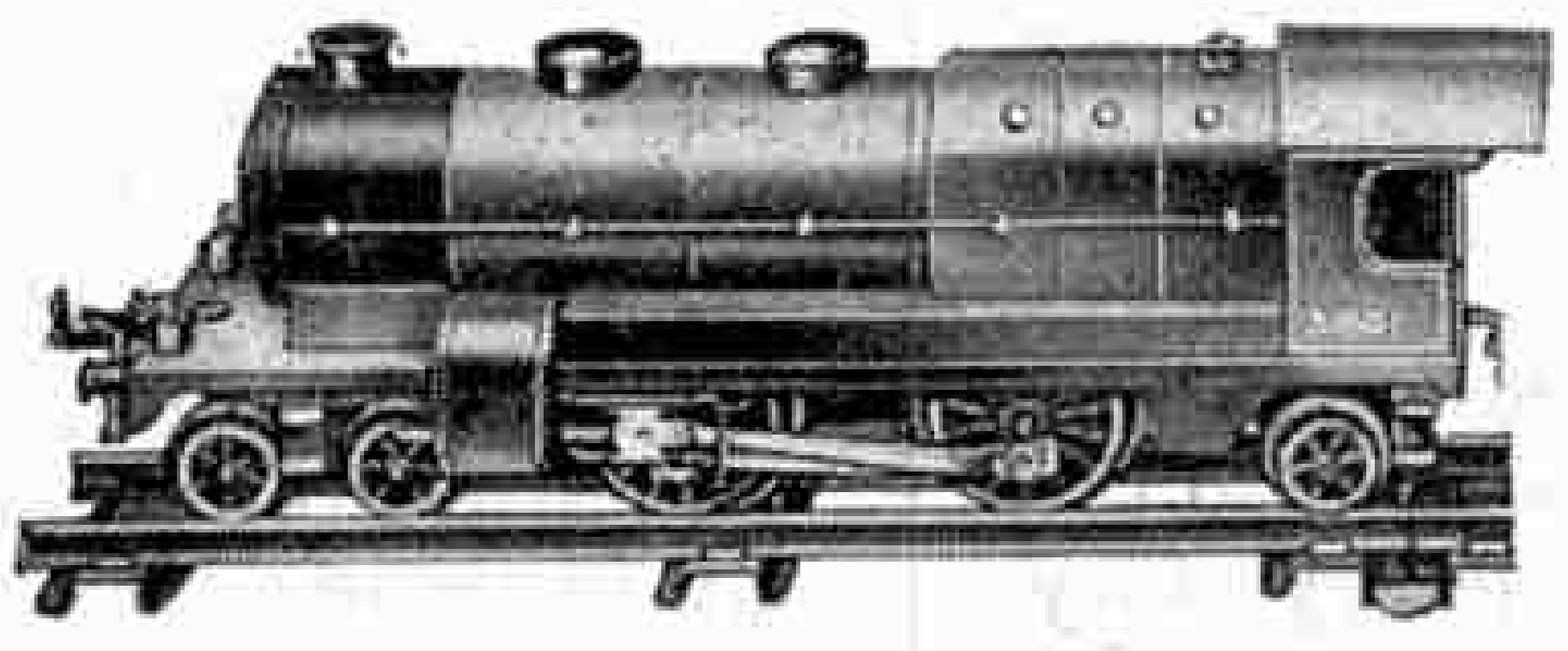
No. O LOCOMOTIVE
(Reversing) ... Price **10/6**



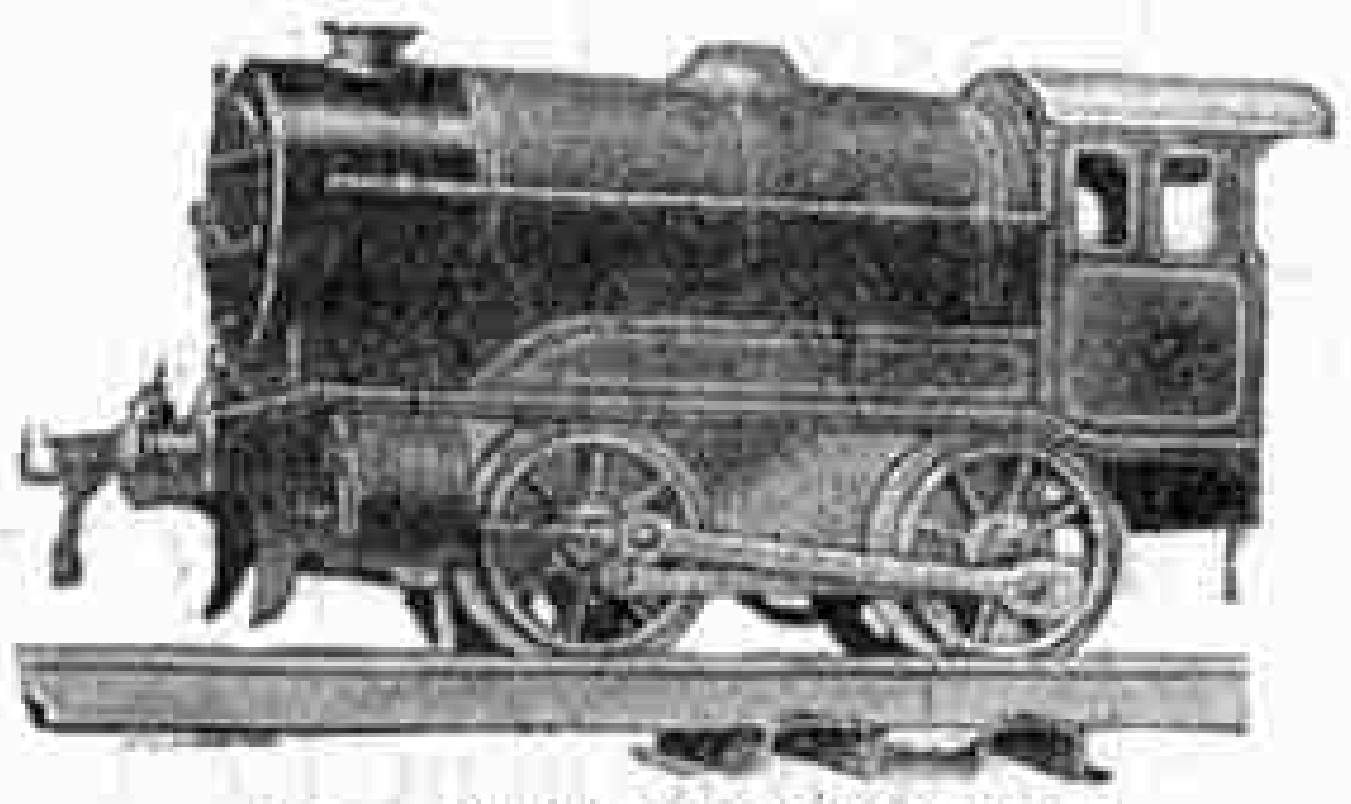
No. 2 SPECIAL TANK LOCOMOTIVE
(Reversing) ... ... Price **21/**



No. 1 SPECIAL LOCOMOTIVE
(Reversing). Price **17/6**

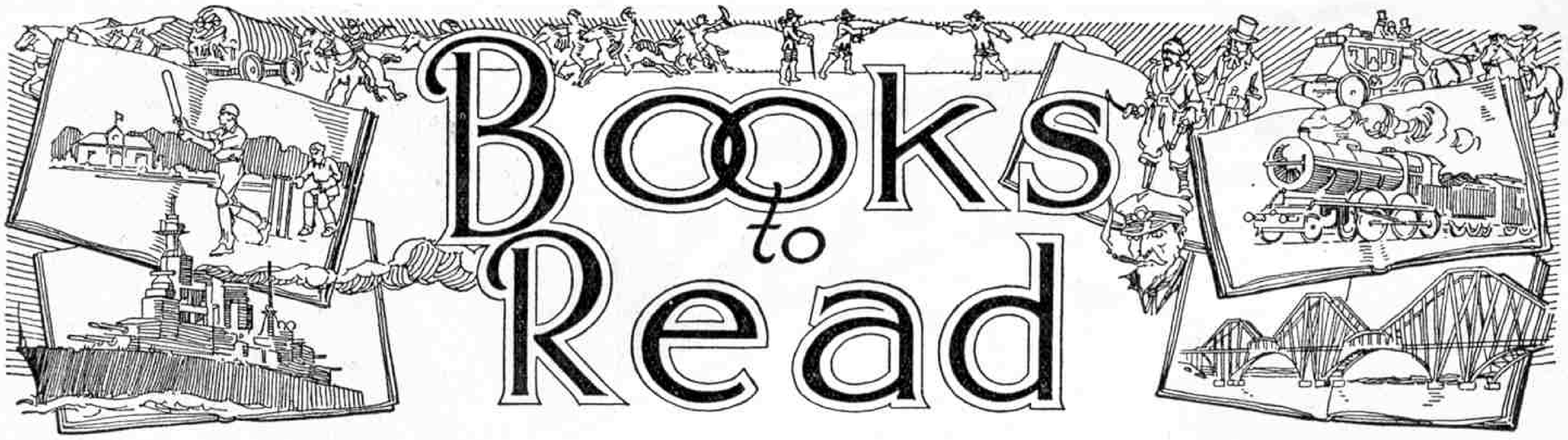


No. 3C RIVIERA "BLUE" LOCOMOTIVE
(Reversing) ... ... Price **24/-**



No. 1 LOCOMOTIVE
(Reversing) ... Price **12/6**

INNS ROAD, LIVERPOOL 13.



Books to Read

"Epic Tales of Modern Adventure"

By T. C. Bridges and H. H. Tiltman
(Harrap. 7/6 net)

In *"Epic Tales of Modern Adventure"* the authors present us with yet another collection of remarkable exploits on land, in air, and on and under the sea; and in many respects their latest effort is their best. In spite of what some gloomy folk would have us believe, there is as much scope for adventure in the world to-day as there was at any previous time. Could anything be more thrilling, for instance, than to descend half a mile below the surface of the sea and watch the strange inhabitants of the watery depths going about their daily affairs? This has been the experience of Dr. William Beebe in the wonderful steel globe that he calls a "bathysphere." The actual greatest depth reached was 3,028 ft. At this point the pressure on the sphere was more than 7,000 tons, but there was no leakage and no trouble of any kind, indicating that much greater depths may be reached before long. By way of contrast there is a stirring account of the ascents of the stratosphere balloons of Professor Piccard and others, in which the enormous height of 12 miles above the Earth was attained.

Mr. Andrew Croft, Lieut. Martin Lindsay and Lieut. A. S. T. Godfrey, the three members of the expedition which crossed the Greenland ice-cap in 1934. (From "Epic Tales of Modern Adventure" reviewed on this page.)

Of land journeys there are described the remarkable Citröen Expedition by car across the Himalayas, covering a distance of 18,000 miles; and the 10,000-mile ride on horseback of Mr. A. P. Tschiffely from Buenos Aires to New York, which was described in the *"M.M."* for January 1935.

There are few more romantic stories in the history of exploration than those concerned with the long sledge journeys that have been carried out with dog teams across the dreary wastes of the Arctic and the Antarctic. Consequently there is special interest in the short but excellent description of Lieutenant Lindsay's expedition across unexplored Greenland. Then we have Andrew Bahr's five-year trek driving 3,000 reindeer across the frozen North of Canada; Frank Buck's adventures as collector of wild animals for the great zoos of the world; the exciting aeroplane rescue of Soviet scientists from the steamship *"Chelyuskin"* in the polar regions; and the extraordinary story of Captain Abraham Kean, the man who caught a million seals!

This interesting and well-written volume is illustrated by 30 excellent photographs.

"Consigned to Davy Jones"

By Captain G. H. Grant
(Hurst and Blackett Ltd. 12/6 net)

In this book Captain Grant describes his third voyage in the half-deck of a British tramp steamer, and the result is even more fascinating and exciting than his earlier book, *"The Half Deck."* When the young officer sailed out of the Firth of Clyde on the old tramp steamer *"Monarch,"* he little foresaw the fate that awaited the veteran freighter, nor the experiences through which he would pass. Sailing south, fire was discovered in the coal bunkers; at the Gold Coast news was received that Great Britain had declared war on Germany; during the voyage across the Atlantic the food began to give out, and the crew threatened to mutiny. Homeward bound from New Orleans the *"Monarch"* sailed to her fate, and what happened off the coast of Ireland forms the closing chapter of as thrilling a narrative as has been written by any present-day sea captain. From first to last this book gives us the real thing, and the tang of the sea is on every page of it.

"The Technology of Woodwork and Metalwork"

By Norman R. Rogers. (Pitman. 12/6 net)

This well-produced volume is intended primarily to help students who are preparing to be teachers of handicraft in schools; and it covers the subject of handicraft technology from the point of view required by the examiners of the City and Guilds of London Institute, the Educational Handwork Association, and the training colleges. Its usefulness does not end here, however, for it will be found of real practical assistance to all who are interested in woodwork and metalwork for decorative purposes. The tools, materials and processes employed are described in detail, and the advice given is above all things practical. The value of the book is greatly increased by the large number of illustrations, which have been excellently chosen for their special purpose and are well reproduced.

"Wild Animals"

Edited by Helen Sidebotham
(Chatto & Windus. 5/-)

A better gift for those who are interested in wild creatures could scarcely be imagined than this collection of 100 photographs of animals. The photographs of the lions, tigers and other big cats are among the finest we have seen, particularly one of an African lion snarling his defiance of humanity. The bears are well represented and so are such creatures as reindeer, moose and bison. Of particular interest are the photographs of smaller and less familiar creatures. There is an excellent one of a Canadian beaver at work on a log, and the opossum photographs are of quite outstanding quality. The standard of reproduction throughout is very high, and the collection as a whole is one that animal lovers will find hard to lay down.

"World Problems of To-day"

By Hebe Spaull
(Student Christian Movement Press. 2/6 net)

This volume is an attempt, and a successful one, to describe simply and clearly, so as to be intelligible to boys and girls in the early teens, the kind of world in which we are living, and the nature of the problems that confront its statesmen. The chapters deal with such topics as disarmament, the League of Nations, Fascism, unemployment and Communism. The author has had the assistance of experts on the different subjects, so that the book can be relied upon as being accurate. It will be very useful for school debating societies, Junior branches of the League of Nations Union, and as a school textbook for children themselves.

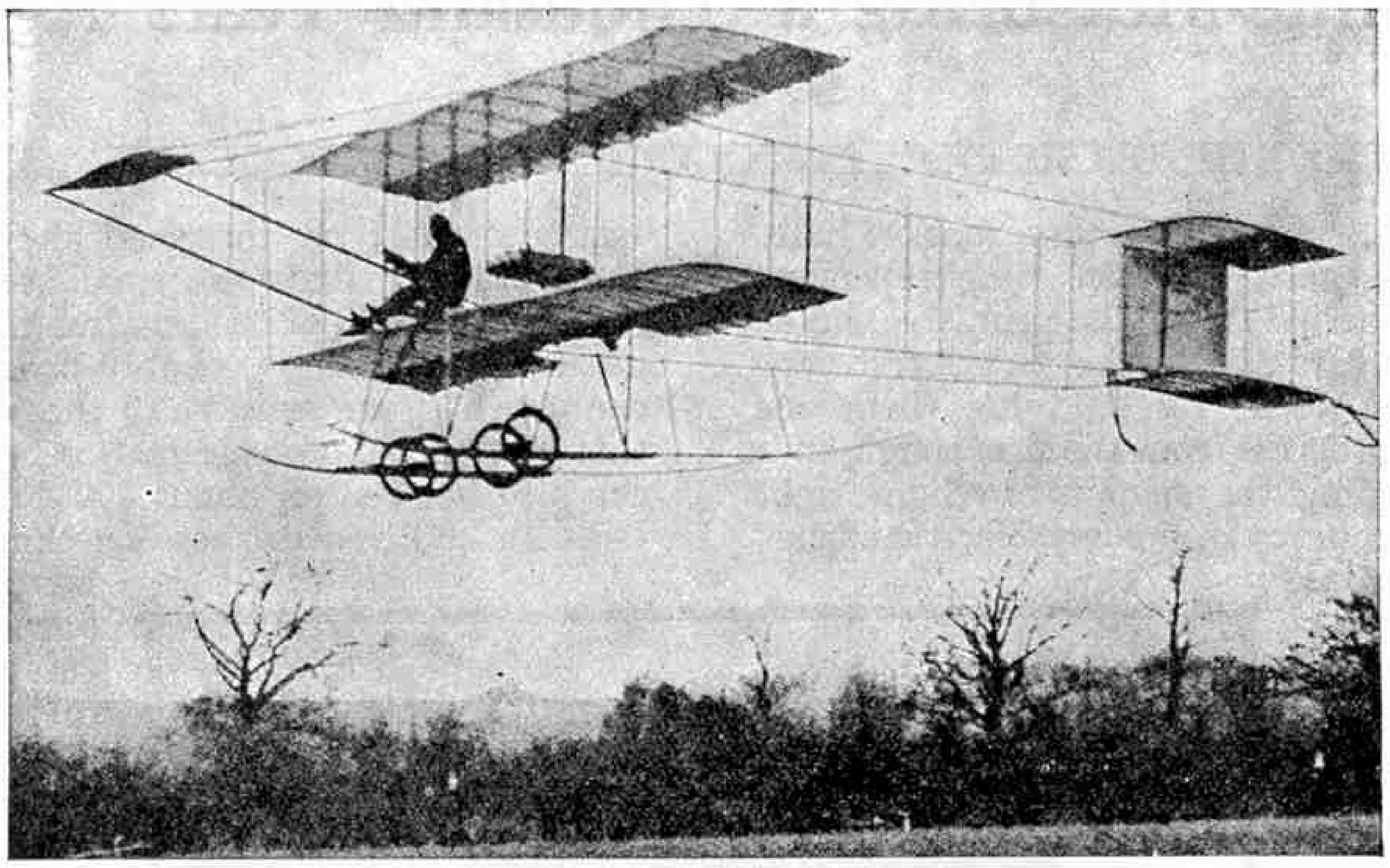
The book will also provide teachers with a good background for talks on current events.

"Speed, Space and Time"

By Vernon Sommerfield. (Nelson. 7/6 net)

Mr. Sommerfield has set out to tell the story of Man's attack on space and time by means of the development of transport by land, sea and air. Starting from the log or tree trunk floating down a river, he shows us how the ship has developed, and how road transport has grown from the war chariots of the Romans to the swift petrol-driven cars that are causing Mr. Hore Belisha so much worry. Transport by rail and in the air is also adequately dealt with.

Perhaps the most interesting section of the book is that which deals with the transport of the future. The author shows the absurdity of the idea that railways will be abolished within the next few years, pointing out that the mass transportation of passengers in England alone would require to-day a far greater fleet of aircraft than the whole world is likely to possess in 20 years from now. The growth in the size of the ocean liner is likely to be checked, and already the present tendency is to build passenger vessels of moderate size and speed and to reduce the number of classes of passenger accommodation. "Show" liners of great size and magnificence probably will continue in small numbers, but most of the traffic will be carried in vessels of from 20,000 to 30,000 tons, with two passenger classes or only one. One great development certainly will be in the direction of many more cabins for one passenger. Finally the author refers to the possibility of the transmission of radio energy that can be picked up by road vehicles of all kinds, trains, ships and aircraft. The book is well illustrated with photographs and drawings.



Mr. Grahame-White flying in a Farman Biplane in 1910. (From "Speed, Space and Time" reviewed on this page.)

"Design in Woodwork"

By Percy A. Wells
(B. T. Batsford Ltd. 6/- net)

Mr. Wells has produced a volume that will be of great value to craft teachers in woodwork, and to all who appreciate simple beauty in every-day things. Apart from its value to schools and institutes, the book should prove an ideal guide to those who, after school age, continue to practise woodwork and the fascinating craft of cabinet making. The illustrations are particularly good. They consist of 25 pages of the author's drawings, showing the construction of articles in wood at every stage, together with a series of some 70 photographic reproductions of finished work.

"A Book of Escapes"

By John Buchan. (Nelson & Sons. 3/6 net)

In his preface the author tells us that he regards romance as meaning in the widest sense "that which affects the mind with a sense of wonder—the surprises of life, fights against odds, weak things confounding strong, beauty and courage flowering in unlikely places." His book certainly gives us this kind of romance in generous measure. The stories are of the kind in which the author excels, and are none the less exciting because they are true.

"Building Construction"
(Elementary Course)

By C. F. Mitchell. (B. T. Batsford Ltd. 6/6 net)

The two volumes of Mitchell's *"Building Construction,"* of which the present volume is the elementary course, have proved remarkably successful, largely as the result of their conciseness and simplicity of method. The aim of the author has been to give a clear statement of the principles that should govern the execution of building work, and to deal with the subject matter so as to render it equally valuable for the student and for the practical man engaged in building. The various sections are very fully illustrated by more than 1,200 drawings.

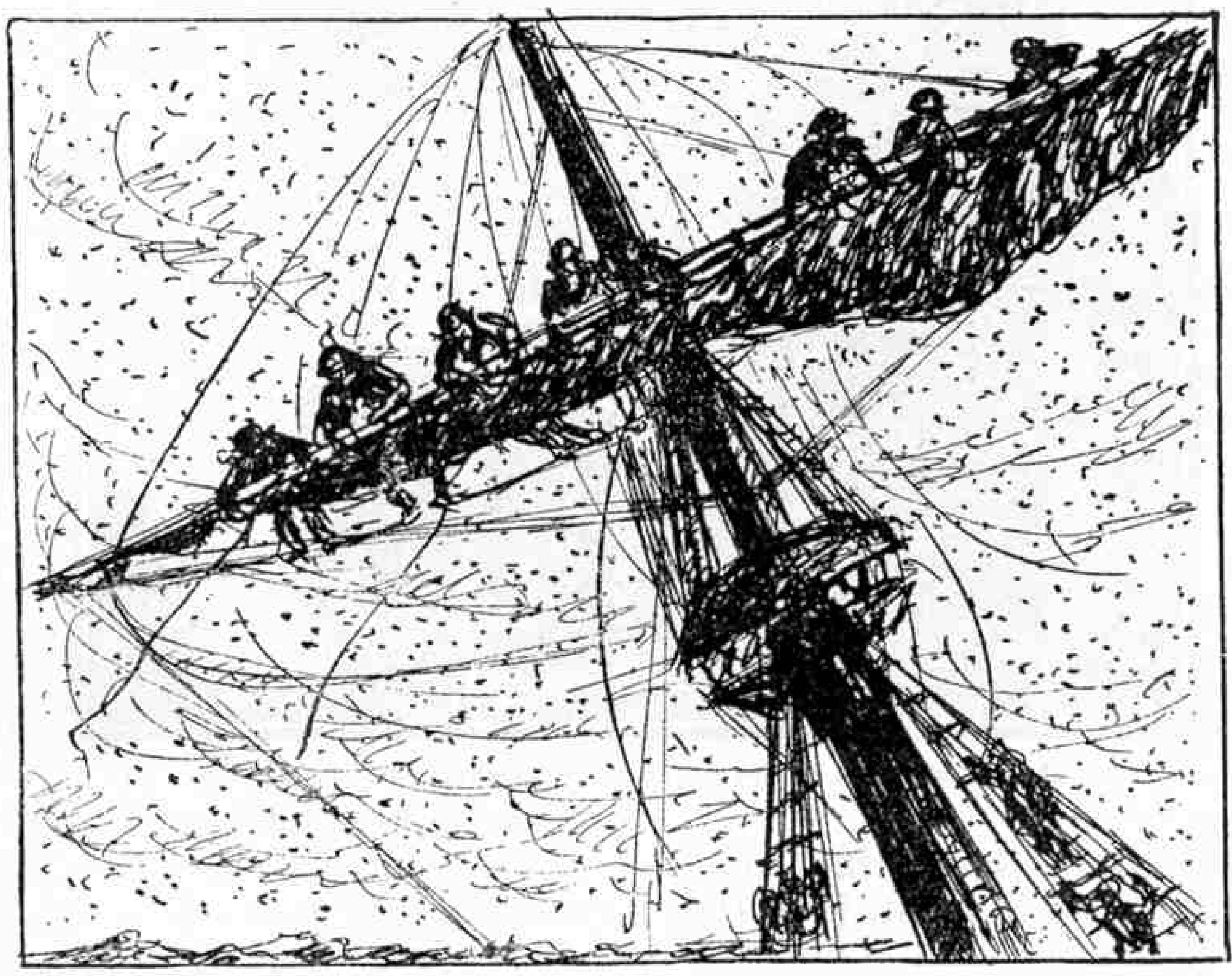
"Ships and how they Sailed the Seven Seas"

By H. W. van Loon. (Harrap. 10/6 net)

Mr. van Loon's previous books, *"The Story of Mankind"* and *"The Home of Mankind,"* led us to expect something of outstanding interest in this volume, and expectations are fulfilled. The special feature of the book is that it is not just a history of navigation from the earliest times to the modern ocean liner, but is also the story of the way in which sailors have lived and gone about their business during the past 7,000 years. It is indeed as much an account of sailors as of the ships that are their homes.

In his typical style the author passes on from age to age. We read of how the State barges of the Pharaohs passed up and down the Nile, how Rome and Carthage struggled for the naval mastery of the Mediterranean, and how the Norsemen, with indomitable courage and determination, defied the fury of the northern seas and actually reached America many centuries before Columbus. Similarly the growth of ships and navigation in other parts of the world is described. The author handles severely the writers of "romantic" stories of the days of sail, and shows the life of the sailor as it really was, with dangers, hardships and privations of all kinds. He shows also that the working conditions of the seamen of to-day leave much to be desired.

The illustrations, of which there are more than 150, are all drawings by the author in his characteristic style.



REEFING A SAIL IN A BLIZZARD WAS NO EASY JOB

(From "Ships and How they Sailed the Seven Seas" reviewed on this page.)

"Motorshipping"
"Motorships"

By A. C. Hardy
(Chapman & Hall. 7/6 net each)

These are valuable books for those who are interested in the origin and development of the motorship. *"Motorshipping"* is a study of the Diesel-engined ship in relation to present-day shipping, showing something of the newest era in sea transport. It deals with motorships of all types, from small cargo vessels to large and fast passenger liners. *"Motorships"* deals in greater detail with this type of ship. It explains the characteristics of all types of mercantile vessels propelled by internal combustion engines, and shows in an interesting manner the features in which these resemble or differ from similar vessels propelled by steam engines. The author is a recognised authority on all matters connected with ships, and his descriptions are as clear as they are accurate.

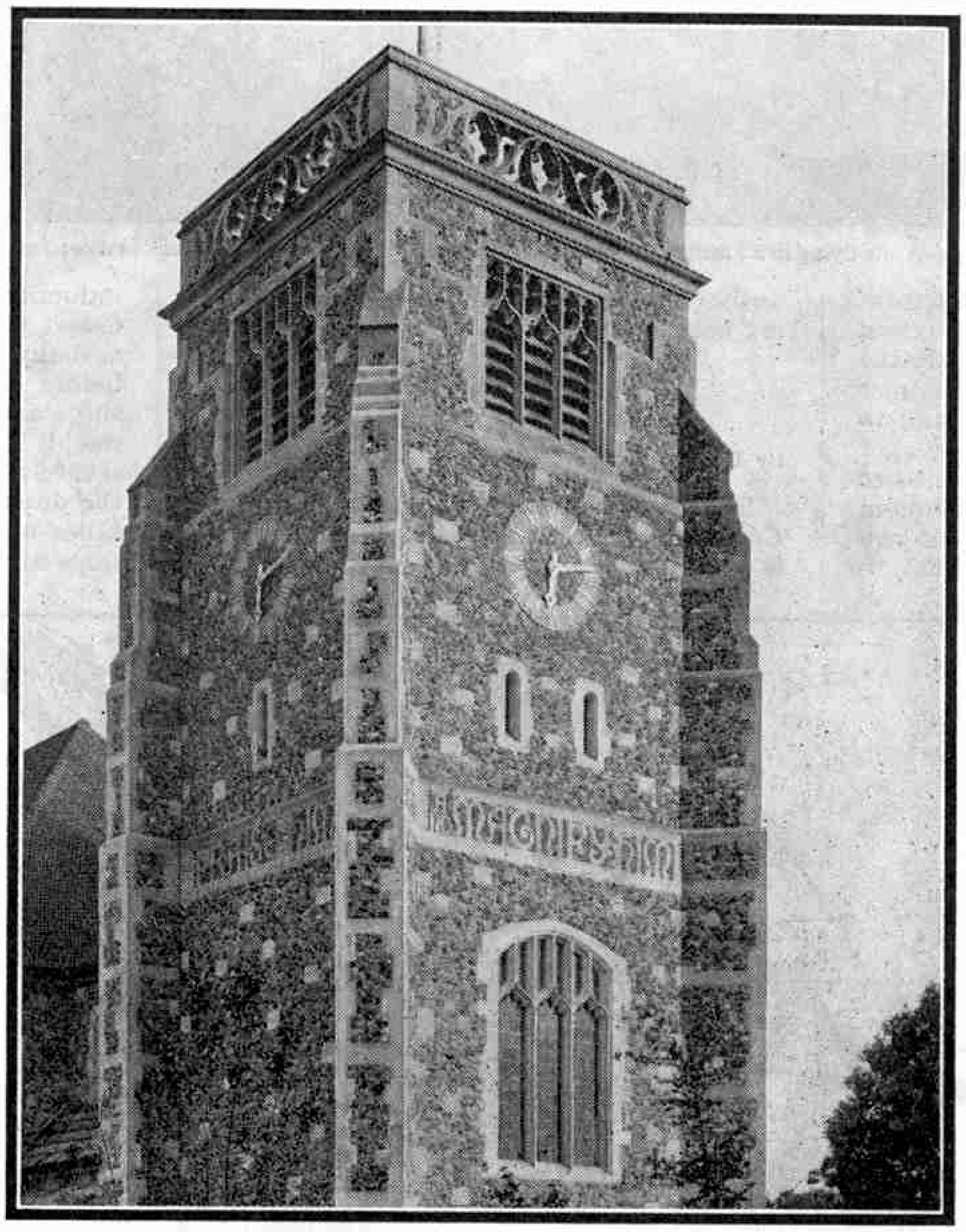
Both volumes are well illustrated by photographs and drawings. It is a matter for regret that in issuing these cheap editions of such valuable works the publishers did not bring the contents up to date.

Early Sundials and Mechanical Clocks

Time-Measuring a Thousand Years Ago

By B. Oliver

On various buildings, such as churches, market halls, offices and houses may be seen timekeepers of almost every kind and period, from the primitive Saxon sundial of a thousand years ago to the very latest type of electric synchronous clock. By studying them one can trace the stages of progress from the first rough-and-ready attempts at dividing the span of daylight right up to the split-second accuracy of modern electric clocks, in which the alternations of the driving current synchronise the clock automatically and keep it to Greenwich Time.


The electric clock on the tower of Woldingham Church, Surrey.

Apart from the changes in design and accuracy of timekeepers themselves, the various types form a most interesting record of some important changes that have occurred in the methods of measuring time.

One of the earliest ways of time measurement in this country is typified by the Saxon dials, which divide the span of daylight into four portions, sometimes called "tides." The Saxon dial on the church at Saintbury, Glos., illustrated on the next page, is typical of this simple method of marking. A good many of the Saxon dials have intermediate lines; some indeed have a full complement of eight intermediates in addition to the "tide" lines. These extra markings often show signs of having been added later in an attempt to adapt the dial to a 12-hour system of timekeeping.

The well-known dial on the south porch of Bishopstone Church, near Seaford, Sussex, is a case in point. Here the intermediate lines are, I think, fairly obviously of different workmanship to the "tide" lines, and may have been added a long time after the dial was set up.

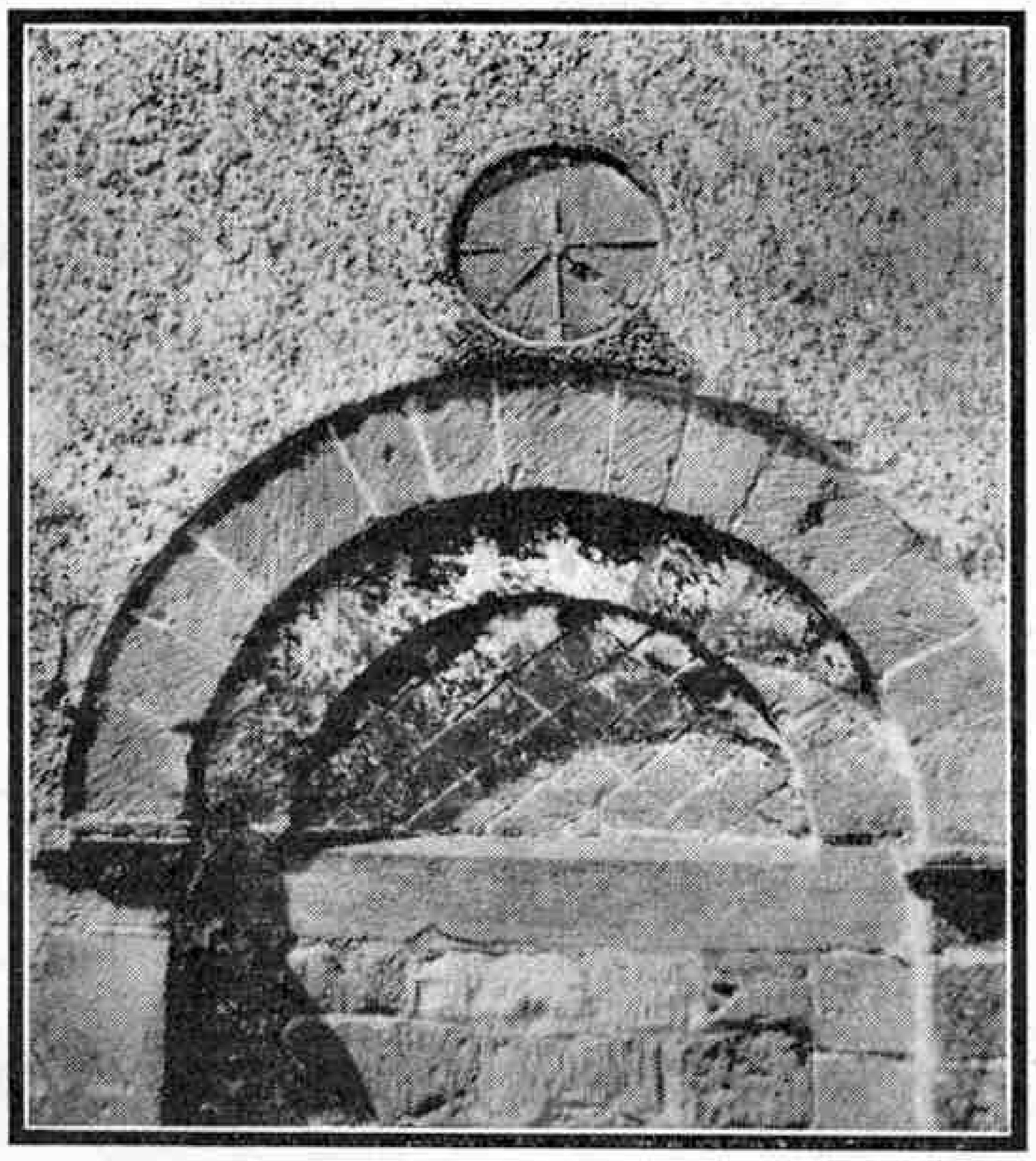
Saxon sundials are chiefly to be seen on old churches, as at Escombe, Co. Durham; Kirkdale and Weaverthorpe, Yorks.; and Corhampton, Warnford and Winchester, Hants. There are a few elsewhere, however, and a notable one, that is believed to date to the Saxon days, is on the famous old cross at Bewcastle, Cumberland.

This type of sundial was followed by the "scratch dial," as a rule consisting of a pointer-hole with several lines radiating from it, the lines being scratched or incised lightly on the vertical face of the stonework. Most of these dials are small and inconspicuous; they take a good deal of finding, but there are plenty of them about. At one time probably nearly every church in the country had one or more of these dials on its walls, and though many have perished or been removed, markings can still be seen on about 1,400 churches in the British Isles. In addition to those on churches, a few specimens have been reported on old barns, etc., but in some cases it seems rather doubtful whether the markings were actually for use as sundials.

Some of the simplest scratch dials have only a few lines, being used merely to mark the times of the principal church services. Other specimens, however, have a full array of hour-lines spaced equally around the semi-circle of the dial. This equal spacing of the lines was evidently intended to divide the span of daylight into 12 equal parts; but it does not do so accurately, being especially inaccurate when used with a straight, horizontal pointer. A partial correction can be made by bending the pointer up or down periodically, but even then the readings are not consistently accurate throughout the year. This did not matter in the free-and-easy life of country villagers in those days. There were no trains to catch then! But eventually people began to feel the need of more accurate time-measurement, and they began to make sundials on a scientific principle so that these would show the time with sufficient accuracy all the year round.

A very interesting connecting link between the primitive sort of scratch-dials of the Middle Ages and the modern scientific sundial can be seen on certain churches. In a transitional dial of this kind the hour-lines are graduated in spacing so that they become closer and closer together as the noon line is approached. On Litlington Church, Sussex, there is a good example of such a dial. The lines are arranged as scientifically as in a modern vertical wall-sundial, and there is a channel for a slanting gnomon, to be set at an angle to suit the latitude of the place, instead of a hole for a straight pointer as in the earlier dials.

So we come to the scientific sundials, of which there are hundreds of examples, horizontal and vertical, and of every conceivable shape and design. They may be seen in gardens, churchyards, quadrangles, etc., at many places. The oldest of these dials date from about the 16th century. In some cases, several dials facing different points of the compass, to catch the sunlight at different times of the day, have been placed on the vertical faces of one pillar or rectangular block. A notable example is in the quadrangle of Corpus Christi college, Oxford. An even more elaborate one stands, or stood, in an orchard at Upton, near Peterborough, where about 12 sundials of curious and varied design have been incorporated most ingeniously in a single block of stone.



Saxon Sundial at Saintbury, Glos. The principal lines, in bold relief, divide the span of daylight into four parts.

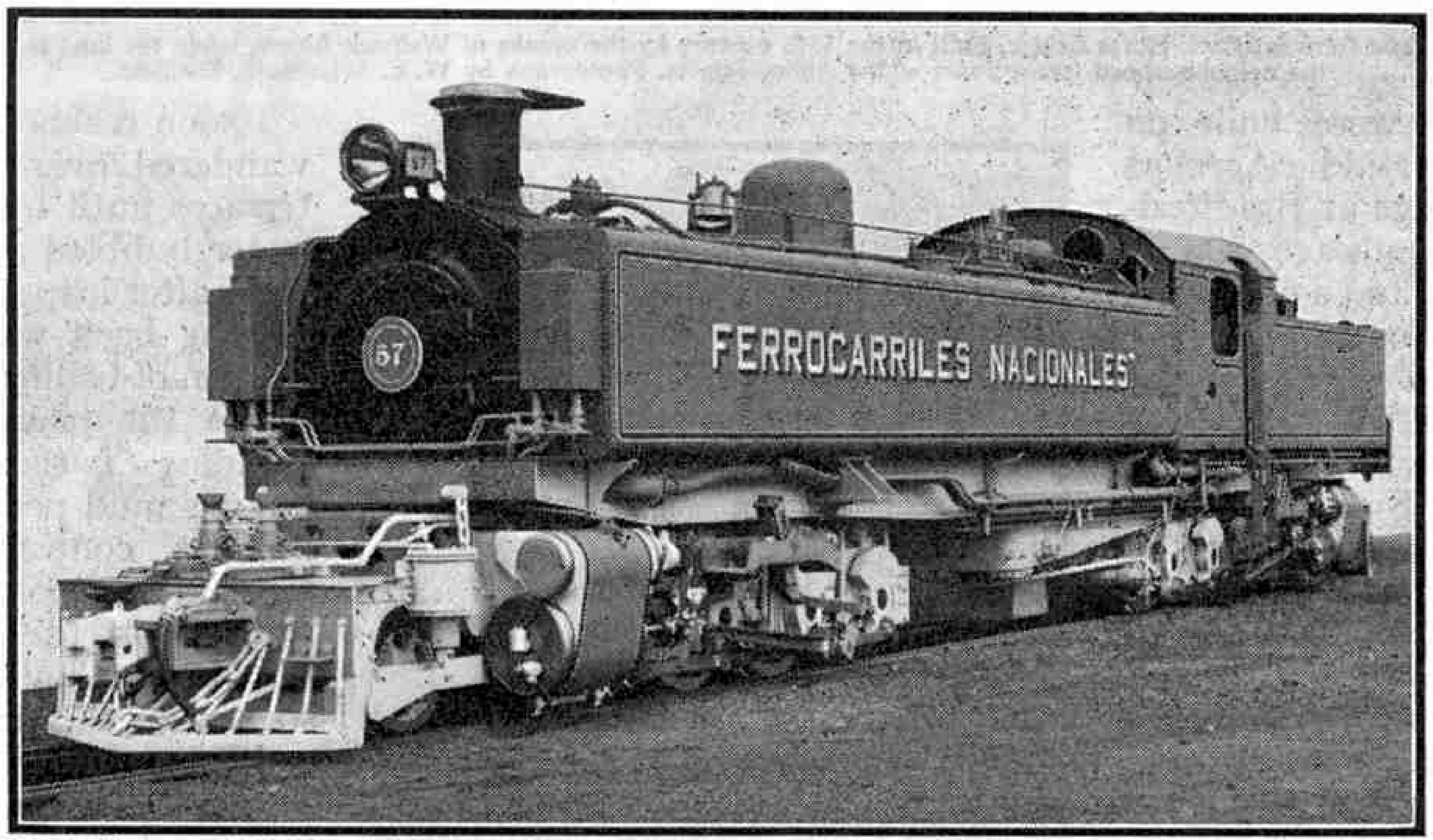
One of the most remarkable of modern sundials is the highly accurate one at Kew Gardens which was devised and set up by Professor C. V. Boys. The dial is in the form of a Greek cross set at an appropriate angle on a pillar. It shows Kew time correct into one minute, and bears tables for each month in the year, giving the corrections necessary to convert the readings into Greenwich time.

About the time that scientific sundials were introduced came the era of clocks. The oldest known mechanical clock still existing in England is in Salisbury Cathedral. It was erected in 1386 in a separate campanile adjacent to the building itself, but when the campanile tower was demolished, at the end of the 18th century, the clock was removed to the central tower of the Cathedral. It continued in use for about 93 years, and was then superseded by the present one.

The mechanism remained, under the tower, until it was "discovered" by present-day experts and brought to the notice of the Cathedral authorities, who had it mounted on a stand and exhibited in the North Transept. The clock was built of iron and the framework was secured with wedges, as it was made before screws came into use for fastening. The wheels have hand-cut teeth, fashioned by chiselling and filing, and have stood up extraordinarily well to the wear of centuries.

New "Kitson-Meyer" Locomotives for Colombia

Articulated Type for Sharp Curves



One of the powerful 2-8-0+0-8-2 Kitson-Meyer locomotives recently built for the National Railways of Colombia. Illustration by courtesy of Robert Stephenson & Co. Ltd., Darlington.

TWO new locomotives of the Kitson-Meyer articulated type have recently been built in Great Britain for service on the Girardot-Tolima-Huila section of the National Railways of Colombia. This 3-ft. gauge system is situated in a mountainous district, the line running up from Girardot to Facativa over an intermediate summit with an altitude of 9,088 ft. Gradients of 1 in 25 are common, as also are curves as sharp as 260 ft. radius.

The new locomotives have the boiler, tanks, cab and bunker all mounted on one frame carried on two separate swivelling power units, each with its own driving wheels and cylinders. The pivots of these power units are placed as closely as possible to the centre of their adhesive wheelbase. The cylinders are placed at the outer ends of the power units. These engines are designed to traverse a curve of 236 ft. minimum radius and can haul a train weighing 340 tons up a gradient of 1 in 25.

The frames of the power unit are outside the coupled wheels giving a compact and accessible arrangement of the axle-boxes and driving gear. To ease the running on sharp curves the second pair of coupled wheels in each power unit has thin flanges, and the driving wheels themselves are flangeless.

The Kitson-Meyer design of locomotive has long been in use in Colombia, the first engines being delivered in 1909. They were of the 0–6–0+0–6–0 wheel arrangement, with a tractive effort of 27,600 lb. This figure has greatly increased in the engines built since that time, and reaches 58,500 lb. at 85 per cent. of the working pressure in the latest 2–8–0+0–8–2 type. It is of interest that although these engines have been designed by Kitson and Co. Ltd., of Leeds, the originators of the Kitson modifications of the Meyer type, the engines actually have been built at Darlington in the shops of Robert Stephenson and Co. Ltd.

The locomotives scale 130 tons each in working order, with a total length over buffers of 66 ft. 4¾ in. They are arranged for oil burning, but are readily convertible for coal firing.

In view of the severe gradients of the line an arrangement is incorporated by means of which the cylinders act as a pneumatic brake on down gradients, thus relieving the ordinary brake shoes. In addition to this, numerous fittings peculiar to locomotives for service Overseas are provided, as can be seen from the illustration. These include automatic centre couplers, front and rear "pilots" or cow-catchers, electric headlights and generator, a warning bell and the screw jacks mounted at the front end. The boiler pressure used is 205 lb. per sq. in. and the total heating surface, including superheater, is 3,207 sq. ft. The grate has an area of 51 sq. ft.

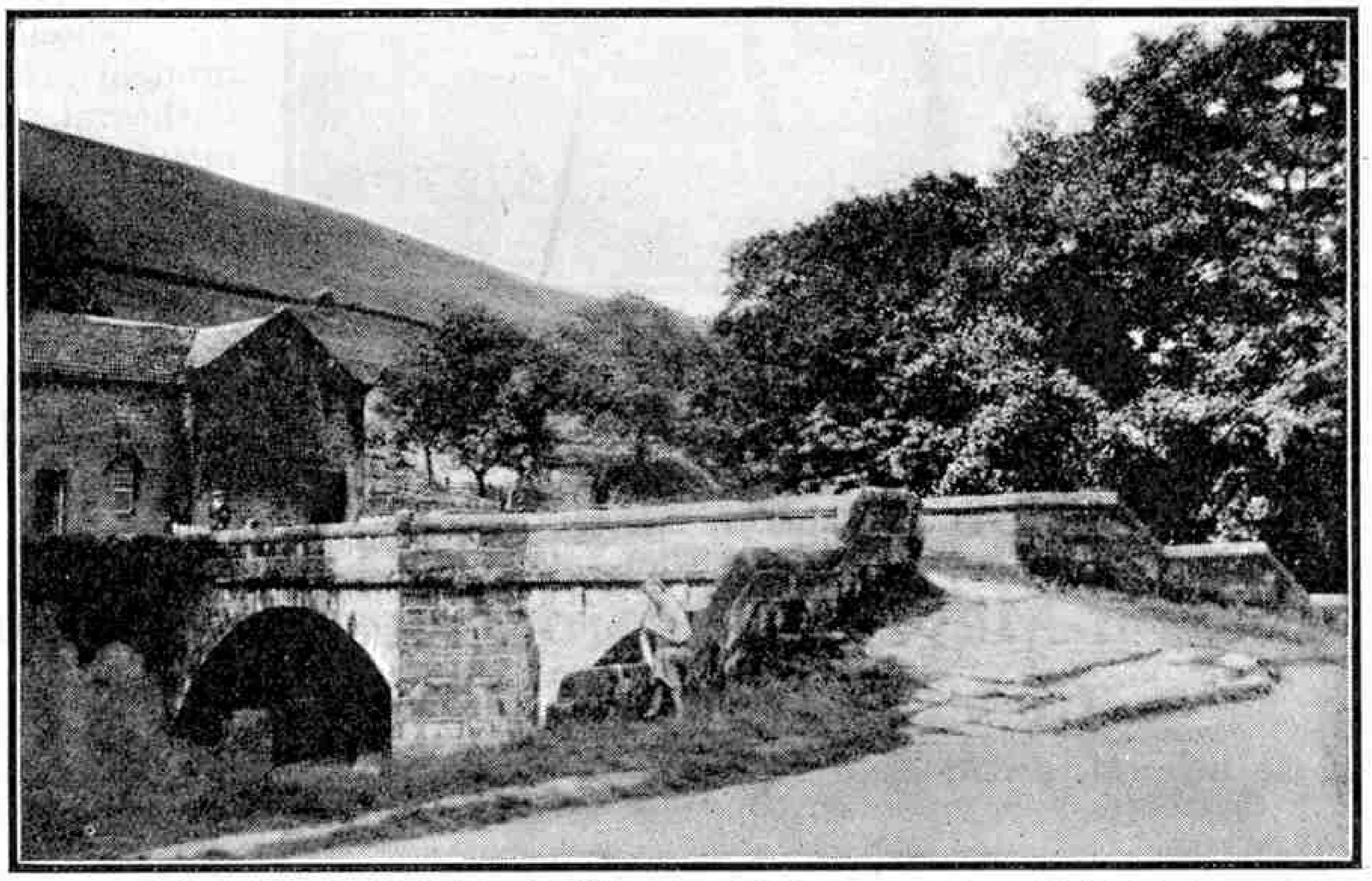
NEW ZEALAND · AUSTRALIA ·
JAPAN
· ARGENTINA · HOLLAND
CHINA
SOUTH AFRICA · CANADA · FRANCE · U·S·A · ITALY · EGYPT · SPAIN · INDIA

from OUR READERS

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Derbyshire Landmark to Disappear

The ancient Pack Horse Bridge shown in the accompanying photograph is in Derbyshire and spans the River Derwent at a point near Derwent Hall. It carries the old bridle path to Glossop over the stream and is a fine example of the workmanship of the monks at Welbeck Abbey, who built it about the 13th century, when the land in the neighbourhood formed part of the Abbey estates. In the centre of the parapet there is a square stone that probably was the base of the cross that once stood there. Chapels often were built on bridges erected in the Middle Ages, as in the case of the bridge at Bradford-on-Avon illustrated on page 598 of last month's "*M.M.*;" and a cross presumably was placed on the narrow Derwent Pack Horse Bridge in lieu of the larger structure.

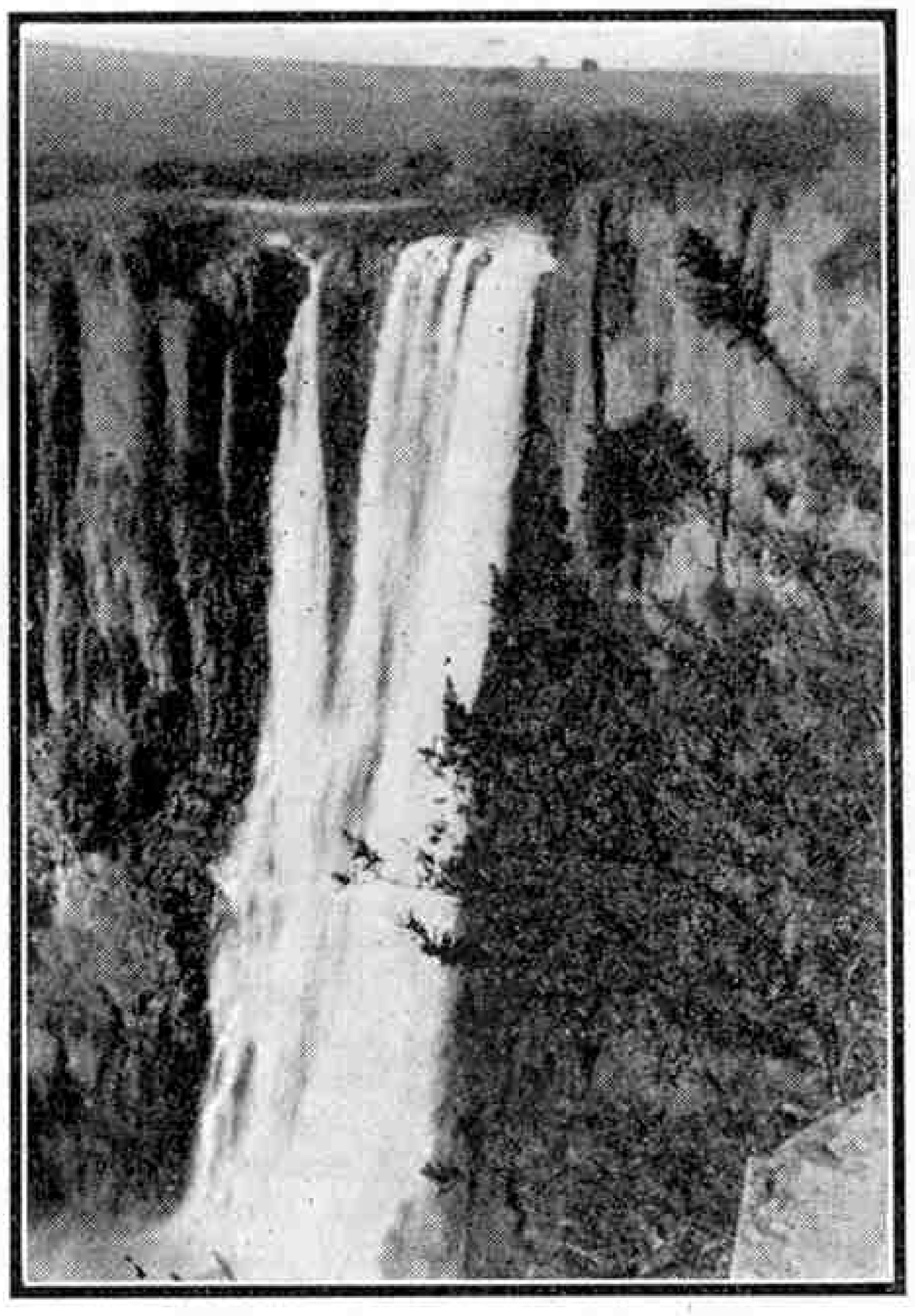


The Derwent Pack Horse Bridge, built in the 13th century by the monks of Welbeck Abbey, when the land in the neighbourhood formed part of the Abbey estates. Photograph by W. C. Wilkinson, Sheffield.

Before the bridge was constructed the river was crossed by a ford. This can be seen a few yards below the bridge, and is still used by carts passing to and from the farm shown on the left.

Pack horse bridges are rare and never again will be crossed by trains of ponies laden with merchandise; but those still to be seen are interesting reminders of a form of transport no longer employed. Unfortunately the site of that across the Derwent will eventually be covered by the water of a reservoir to be constructed by the Derwent Valley Water Board, but there is a possibility that the bridge will be removed stone by stone and re-erected elsewhere.

W. C. Wilkinson (Sheffield).



Howick Falls, where the Umgeni River plunges over a precipice twice as high as Niagara. Photograph by R. Weil.

My Visit to New Zealand's Wonderland

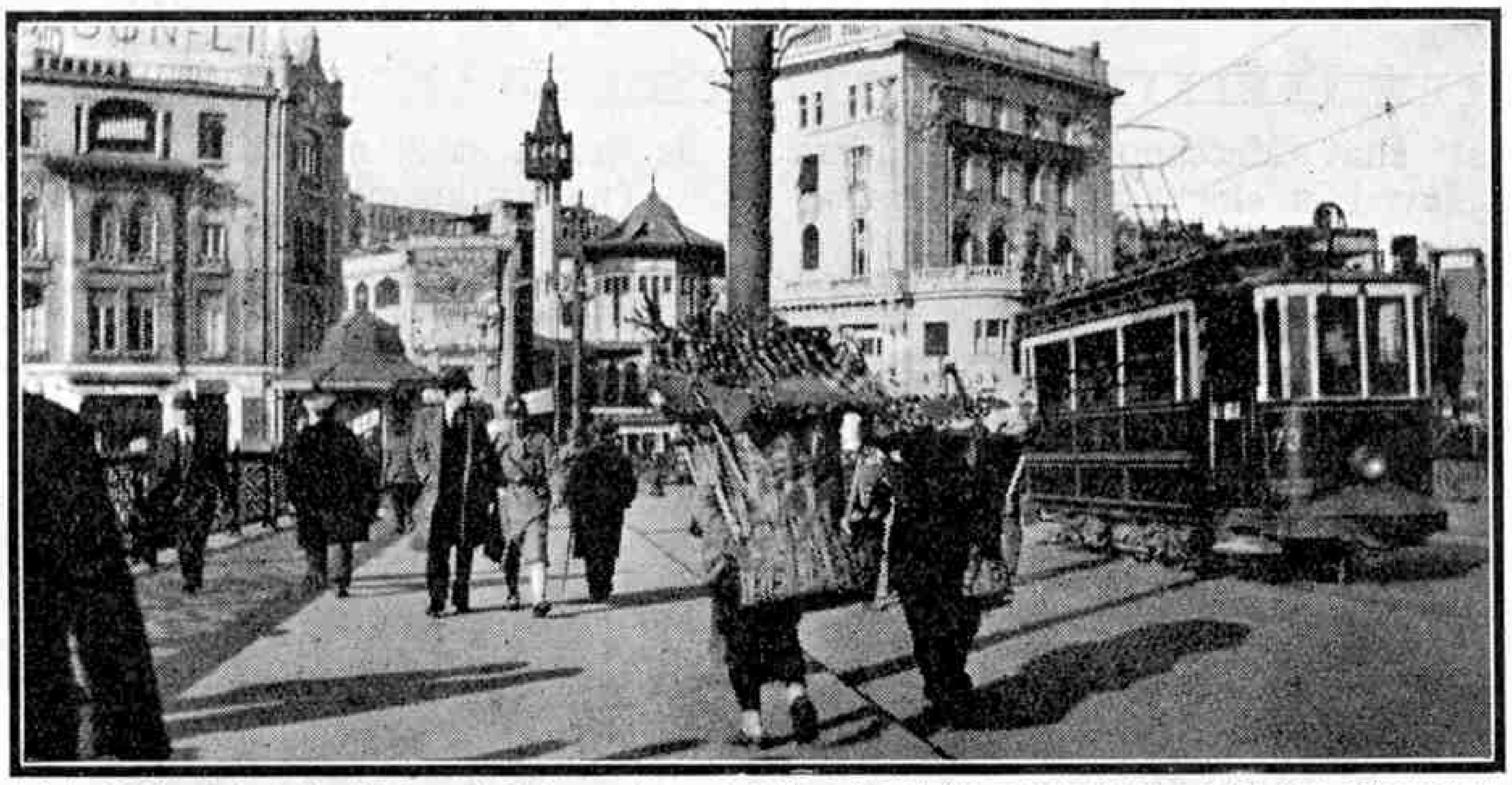
Some time ago I took advantage of an opportunity to visit Rotorua, the centre of the volcanic region of the North Island of New Zealand. The boiling pools and geysers I wished to see are in the area known as Whakarewarewa, about a mile from Rotorua itself; and on the way there I came upon women cooking their evening meal by wrapping potatoes and other foodstuffs in sacking and lowering them into a boiling pool, in which cooking was completed in a very short time.

I soon reached my destination and wandered over the famous volcanic terraces until I saw a crater in which water bubbled and frothed. I walked away after inspecting this pool, and on looking back was surprised to see a column of boiling water spouting right above the place where I had been standing. I then passed on to the famous mud pools, in which hot mud bubbles continuously into curious forms. One pool is known as the Lily Pond from the shape taken by the bubbles as they burst on the heaving surface of the mud.

After spending a long time watching the mud pools and the hot springs and geysers, I discovered another attraction in the form of a model Maori "pa," or village. Every building in this village is adorned with amazingly artistic Maori carvings. A storehouse was particularly attractive, and I was interested to see that the eyes of the many carved figures with which it was adorned were inset with mother of pearl. E. M. Melton (Hamilton, N.Z.).

The Street Porters of Istanbul

While in Istanbul I was continually surprised by the size and weight of the loads carried by Turkish porters. Many of these often could be seen passing in single file across the magnificent Galata Bridge, which connects the districts of Stamboul and Galata. There seems to be no limit to the weight a porter is allowed to carry, and it is by no means unusual to encounter a procession of 20 or 30 men, each bent almost double under a huge sack of grain. The men walk near the edge of the pavement, or even in the gutter, paying little attention to traffic regulations and apparently trusting to luck and the judgment of passing motorists. Their strange choice of path can readily be understood on seeing them at work, however, for many of the loads they carry obstruct their view to such an extent that the curbstone is their only reliable guide.



Galata Bridge, Istanbul, with heavily laden porters using the edge of the pavement as a guide line. Photograph by P. Lawrie, Southampton.

All loads are carried on the back, and are supported on a curious type of saddle that has the form of an inverted "T." The saddle is made of leather and canvas, stuffed with straw or similar material, and rests on the small of the back, where it is held in position by means of straps looped round the shoulders.

When a porter is carrying furniture, baskets of fruit, or articles that are bulky rather than weighty, he usually walks upright and keeps his load steady with his hands, or with the aid of a belt passing across his forehead. Heavier loads, which often have to be lifted into position by two or even three men, are not held in this manner, and the porter's arms swing loosely at his side as he plods slowly along.

P. Lawrie (Southampton).

A Famous South African Waterfall

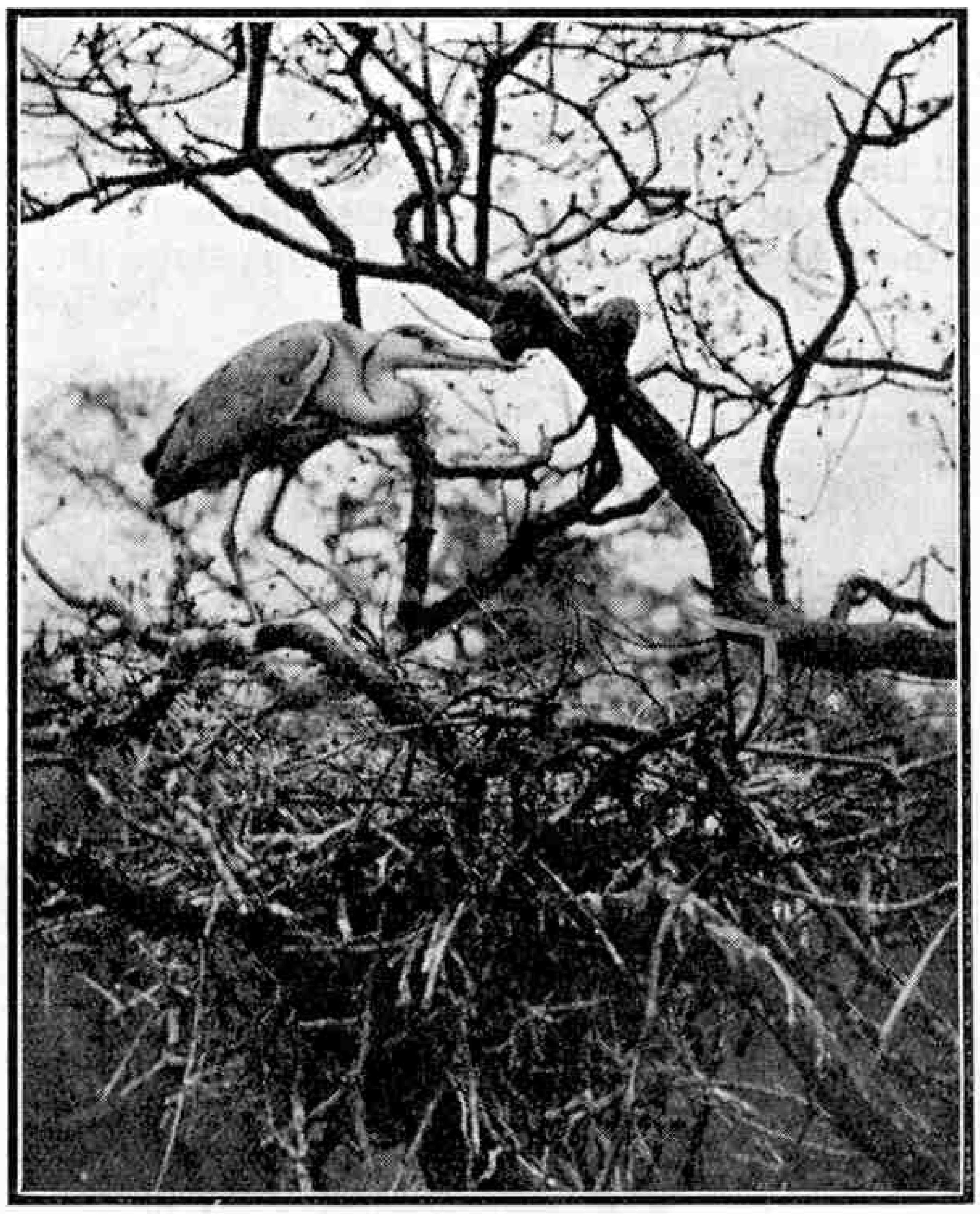
South Africa abounds in large waterfalls, and two of them, the Victoria Falls in Rhodesia, and the fine but much less known Aughrabies Falls in Bushmanland, are among the greatest in the world. These cataracts surpass all other South African waterfalls in majesty and grandeur, but at Howick, Natal, there is a fall that is very impressive, for there the Umgeni River plunges over a precipice of trap rock 364 ft. high, or twice the height of Niagara Falls.

The Howick waterfall probably attracts more admirers than any other in South Africa because it is so easily accessible. It can be reached from Pietermaritzburg, 14 miles away, by means of an electric railway and an excellent motor road, and every week-end scores of visitors admire this great avalanche of seething water.

I recently travelled all the way from Capetown to spend a delightful three days at the charming little township of Howick. During my visit, weather conditions were ideal for photography, and I took some excellent snaps of the falls, one of which is reproduced on the opposite page. The Umgeni River is rather low in May, the time of my visit, and the fall is at its best in February, when the river is swollen by rain and there is sufficient water to make it one of the most imposing cataracts in the world. R. Weil (Capetown, S.A.).

Photographing a Heron's Nest

Last summer I spent many hours watching a colony of herons, and secured many interesting photographs, one of which is reproduced on this page. As the heron has a wing span of nearly 6 ft. it can only alight on the highest branches of the tree in which it makes its nest. A "hide" in which to conceal myself and my camera could only be built on a level with two of the 18 nests in this heronry, and one of the two was in the wrong position for light.



A heron's nest in the top of an oak tree in a Lincolnshire wood. Photograph by H. Auger, Lincoln.

The structure I erected near the only nest I could photograph consisted of branches and pieces of sacking, and I found it very uncomfortable, for I had to stand with my feet in the acute-angled junction of two branches. It was only 8 ft. from the nest, and the necessity for keeping still can be realised from the fact that the heron left the nest hurriedly, protesting loudly, immediately she heard the click of the shutter of my camera. When disturbed in this manner the bird did not return until about 20 minutes later. Even then she settled in another tree and watched the hide suspiciously for about a quarter of an hour before plucking up courage to fly on to the side of her nest, and a further 10 minutes were spent in staring at my hide, and snapping her large yellow beak in anger. Finally she settled on to her eggs with a deep grunt, and gave me the opportunity for which I had waited so long. H. Auger (Lincoln).

Another Fine Meccano Clock

Driven and Controlled by Mains Current

THE great interest that Meccano model-builders have recently displayed in clocks of all types has prompted our expert model-building staff to design an electric clock to be driven by alternating mains current. The driving motor is of the type known as synchronous, which means that it keeps in step with the frequency, or rate of change of direction, of the alternating current supply used. Clocks fitted with motors of this kind cannot run fast or slow, need no winding and are practically noiseless in operation. For this reason they are very popular, especially in the form of small mantel clocks.

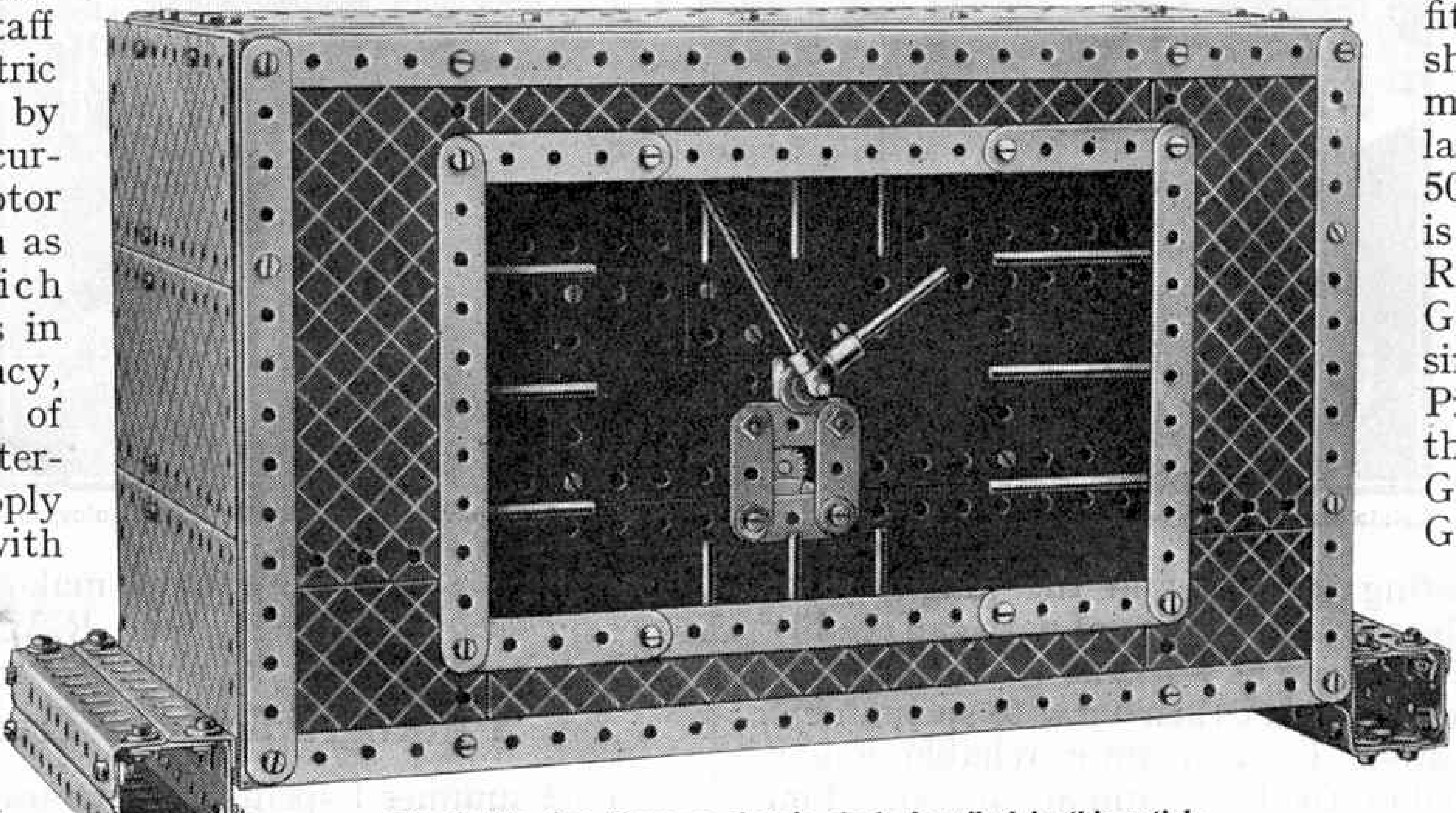


Fig. 1. The fine Meccano electric clock described in this article.

Commercial synchronous clocks are driven directly from alternating current mains, but the clock described in this article obtains the necessary current through a Meccano T6A, T6 or T6M Transformer. As will be seen from Fig. 1, the Meccano clock is artistic and thoroughly modern in appearance, an when properly adjusted it keeps accurate time.

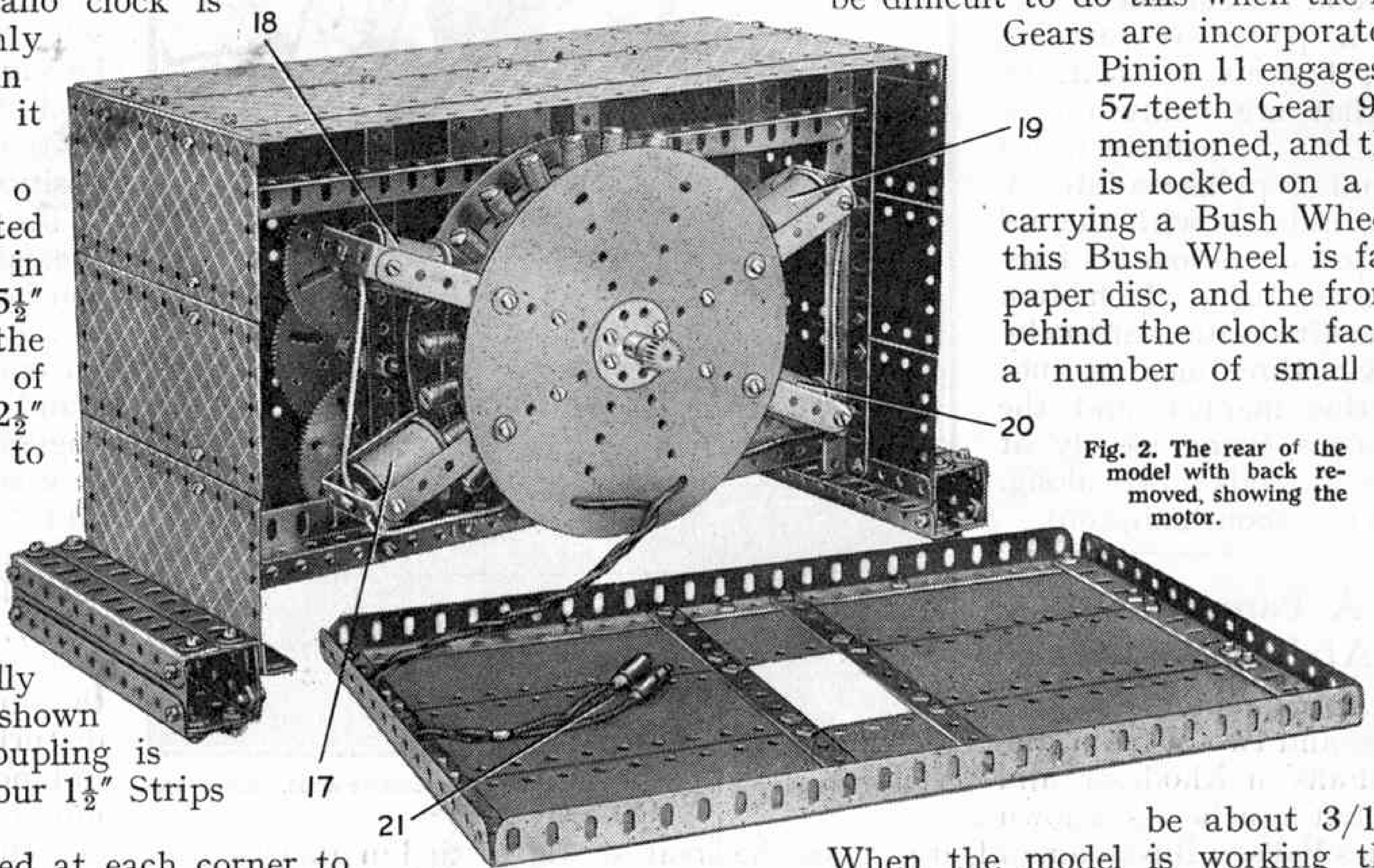


Fig. 2. The rear of the model with back removed, showing the motor.

The front and back o the model are not bolted in place but are held in position by the four 5½″ Angle Girders forming the upper and lower corners of the case. Three 2½″ × 2½″ Strip Plates are bolted to the centre of the face as shown, and are so arranged that an opening 1½″ × 1½″ is left in the centre. Before this opening is partially filled up in the manner shown in Fig. 1, a Socket Coupling is added, after which the four 1½″ Strips are bolted in place.

The clock face is bolted at each corner to a 5½″ Angle Girder, the connection being made three holes from the front end of the Girder. Two extra 7½″ Strips 1 and 2 are fitted to the back of the clock face, the first forming a bearing for three of the gear train axles. Immediately behind the 12½″ Angle Girders of the face two similar Angle Girders are fitted, one of which is shown at 3, near the bottom of Fig. 3.

The arrangement of the main gear train is shown in Fig. 3. A ¾″ Pinion, fitted on the armature shaft of the induction motor as described later, meshes with a 50-teeth Gear 5. This is mounted on a 1½″ Rod that carries a 1″ Gear meshing with a similar Gear. The ½″ Pinion 6, driven by the last mentioned 1″ Gear, rotates a 2½″ Gear 7 secured on the same Rod as another ½″ Pinion, which drives a 2½″ Gear 8 through the medium of two further ½″ Pinions and two 2½″ Gears. This arrangement is shown in Fig. 3.

The Rod supporting the last 2½″ Gear of this section of the gear train carries also a 57-teeth Gear 9 and a ¾″ Pinion, the Pinion being in mesh with a 50-teeth Gear on the 1½″ Rod 10.

At this stage the indicator should be fitted, as it will be difficult to do this when the remaining Gears are incorporated. A ½″ Pinion 11 engages with the 57-teeth Gear 9, already mentioned, and this Pinion is locked on a 1½″ Rod carrying a Bush Wheel 12. On this Bush Wheel is fastened a paper disc, and the front, visible behind the clock face, carries a number of small lines or triangles as shown in Fig. 1. These are drawn in with Indian ink, and they should be about 3/16″ apart.

When the model is working this paper disc rotates in a clockwise direction, and looked at from the front of the clock the upper portion of the disc is seen moving.

Continuing with the main gear-train, the 50-teeth Gear is secured on the Rod 10, together with a ¾″ Pinion that drives a second 50-teeth Gear on the 1½″ Rod 13.

A ½" Pinion is also mounted on this Rod, and this is in mesh with a 57-teeth Gear on the minute hand shaft. In addition to this Gear, a ¾" Pinion and a second 57-teeth Gear are carried by the minute hand shaft. This 57-teeth Gear is free to rotate, but is clamped by its boss in one end of the Socket Coupling mentioned earlier. The Socket Coupling, which has a Collar in its opposite end, carries in one of its threaded holes a Rod Socket the plain hole of which is inserted in a 1½" Rod forming the hour hand. The minute hand consists of a 2½" Rod attached to its appropriate Rod by means of a Handrail Coupling.

The ¾" Pinion carried on the minute hand axle is in engagement with a 50-teeth Gear 14, and this is secured on a 1" Rod together with a further ¾" Pinion. This meshes with a 50-teeth Gear on the Rod 15, which is also fitted with a 1" Gear driving a second similar part on the Rod 16. A ½" Pinion on this latter Rod engages with the 57-teeth Gear, already mentioned, that is coupled to the hour hand by the Socket Coupling.

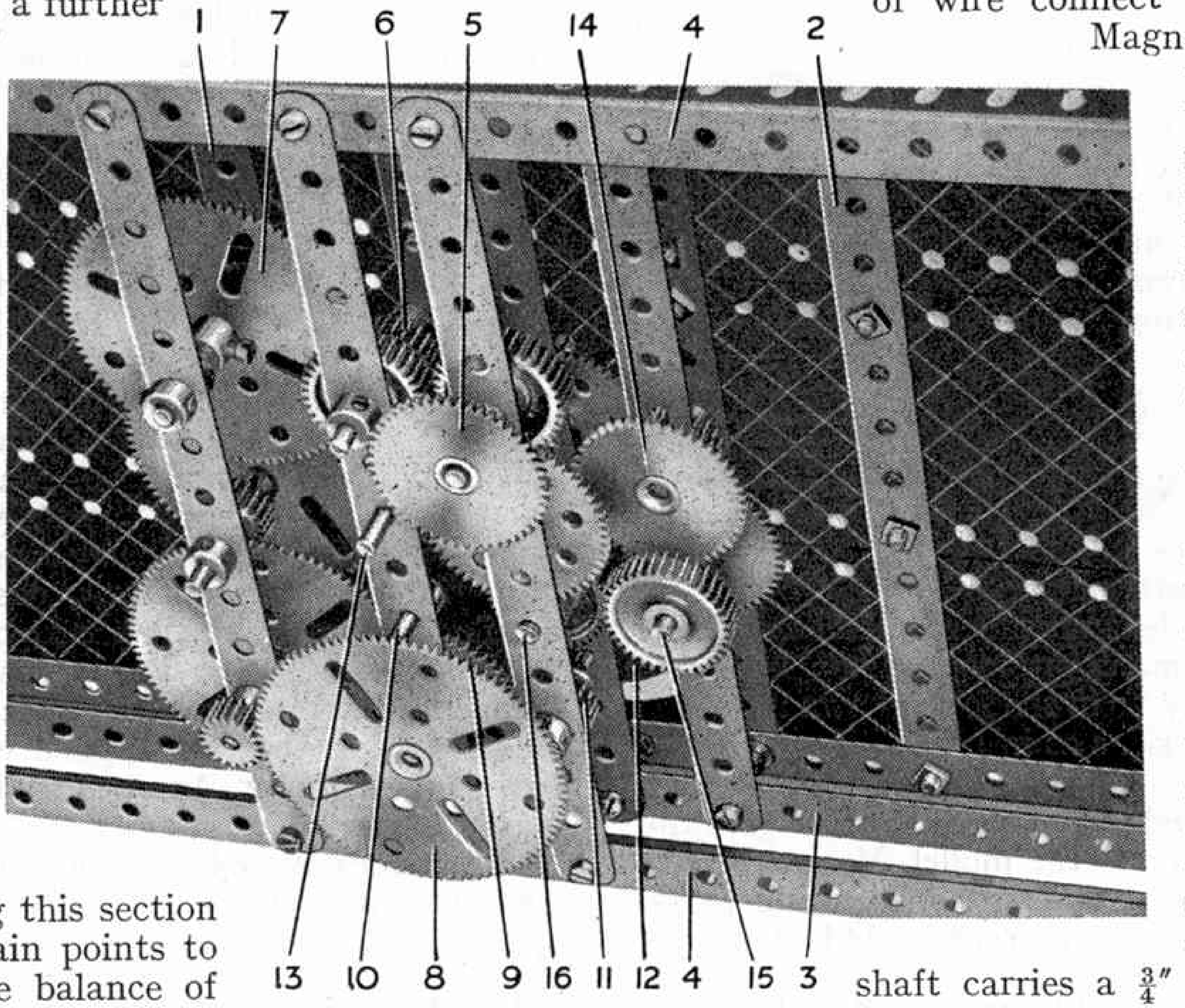


Fig. 3. The compact 15,000 : 1 gear train that is incorporated in the clock.

This completes the gear transmission, and when all the bearings have been lined up and the Rods made to work freely, the construction of the motor is commenced. Great care must be taken in building this section of the model, the two main points to be remembered being the balance of the rotor and the freedom with which it rotates.

Each side of the motor consists of a 6" Circular Plate, Fig. 2, fitted at its centre with a Bush Wheel and at its outer edge with four 3½" Strips. These Strips are arranged as shown, and when the motor is ready for assembling they are fitted at their outer ends with 1½" × ½" Double Angle Strips.

The rotor is formed from a Hub Disc, mounted on a Bush Wheel at its centre. This Bush Wheel must be secured in place so that the Hub Disc rotates with perfect truth, and care must be taken to see that this is so. Another important point is that the Rod on which the rotor is mounted must be free from even the slightest bend. Each pole of the rotor is built up from a Pivot Bolt carrying on its shank nine Washers. It should be noted here that these Washers are not perfectly flat, but are slightly concave. Therefore, in order to ensure all poles being the same height, the concave sides of the Washers must face the same way. There are 24 poles on the rotor, and these must be spaced equally by means of a pair of dividers. When the rotor is complete and correctly balanced, the sides of the motor are passed over the two ends of the rotor axle.

The ends of the 3½" Strip are now joined together by means of 1½" × ½" Double Angle Strips, and the Magnet Cores are secured in the centre holes of the Magnet Coils. Four Washers are used on the threaded portion of each Magnet Core for spacing purposes.

The electrical connections may now be made, and for this reference should be made to Fig. 2. One of the Plugs 21 is connected to the inner terminal of Magnet Coil 17, that is the terminal nearer the Magnet Core, and the remaining terminal of this Coil is connected to the inner terminal of Magnet Coil 18. Lengths of wire connect the outer terminal of Magnet Coil 18 to the outer terminal of Magnet Coil 19, and the inner terminal of the latter to the outer terminal of Magnet Coil 20. Finally the remaining terminal of Magnet Coil 20 is coupled to the second of the two Plugs 21.

The clearances between the Magnet Cores and the rotor poles must be adjusted when the wiring has been completed. They must be as fine as possible, and 1/32" is the maximum allowable. The rear end of the rotor shaft is fitted with a ½" Pinion for use in starting up, and the opposite end of this shaft carries a ¾" Pinion, which engages with the 50-teeth Gear 5 when the motor is placed in position. 12½" Angle Girders, secured to one side plate of the motor by 2½" Angle Girders, are used for securing the driving unit.

The motor has been designed to run at a speed of 250 r.p.m. on alternating current of 50 cycles, that is current changing direction 50 times in a second. To start it, the Plugs 21 are connected to the Transformer and the rotor is spun in a clockwise direction, looking from the rear. It is necessary to spin the rotor at its correct speed of 250 r.p.m. before it will continue running, and a little practice may be necessary before this speed is found. In cases where the frequency of the supply is not 50 cycles the speed of the rotor must be found and the gearing altered accordingly. The speed of the rotor is obtained by multiplying the number of cycles by 120 and dividing the result by the number of poles.

The construction of the case and the fitting of the celluloid front cover are shown in Figs 1 and 2.

The Editor will be glad to help readers who find any difficulty in constructing this interesting clock.

Parts required to build the Clock:

2 of No. 1
13 " " 1b
4 " " 2
4 " " 2a
8 " " 3
8 " " 5
4 " " 6a

12 of No. 8
8 " " 8b
12 " " 9
2 " " 9d
6 " " 15b
5 " " 16a
1 " " 16b

12 of No. 17
3 " " 18a
1 " " 18b
1 " " 22a
4 " " 24
5 " " 25
8 " " 26

5 of No. 27
3 " " 27a
4 " " 27c
4 " " 31
185 " " 37
12 " " 37a
312 " " 38

4 of No. 48
20 " " 59
4 " " 63
8 " " 103
8 " " 111
4 " " 111c
1 " " 118

1 of No. 136a
2 " " 146
24 " " 147b
1 " " 171
1 " " 179
1 " " 186
2 " " 188

4 of No. 189
3 " " 193
14 " " 195
7 " " 197
4 " " 1538
4 " " 1583
4 " " 1599

4' 6" Insulated Wire
1 Piece of Celluloid 5½" × 8½"
2 Plugs

In Search of New Models

Commercial Motor Vehicles

MANY excellent subjects for new models are provided by commercial motor vehicles, and the great variety of types in this class provides interesting subjects for almost any range of parts. Commercial vehicles are generally easier to construct than private cars, as the bodywork is not usually designed with so many curves. Bonnets, cabs and bodies are mostly angular in design, and are easily reproduced with Meccano parts.

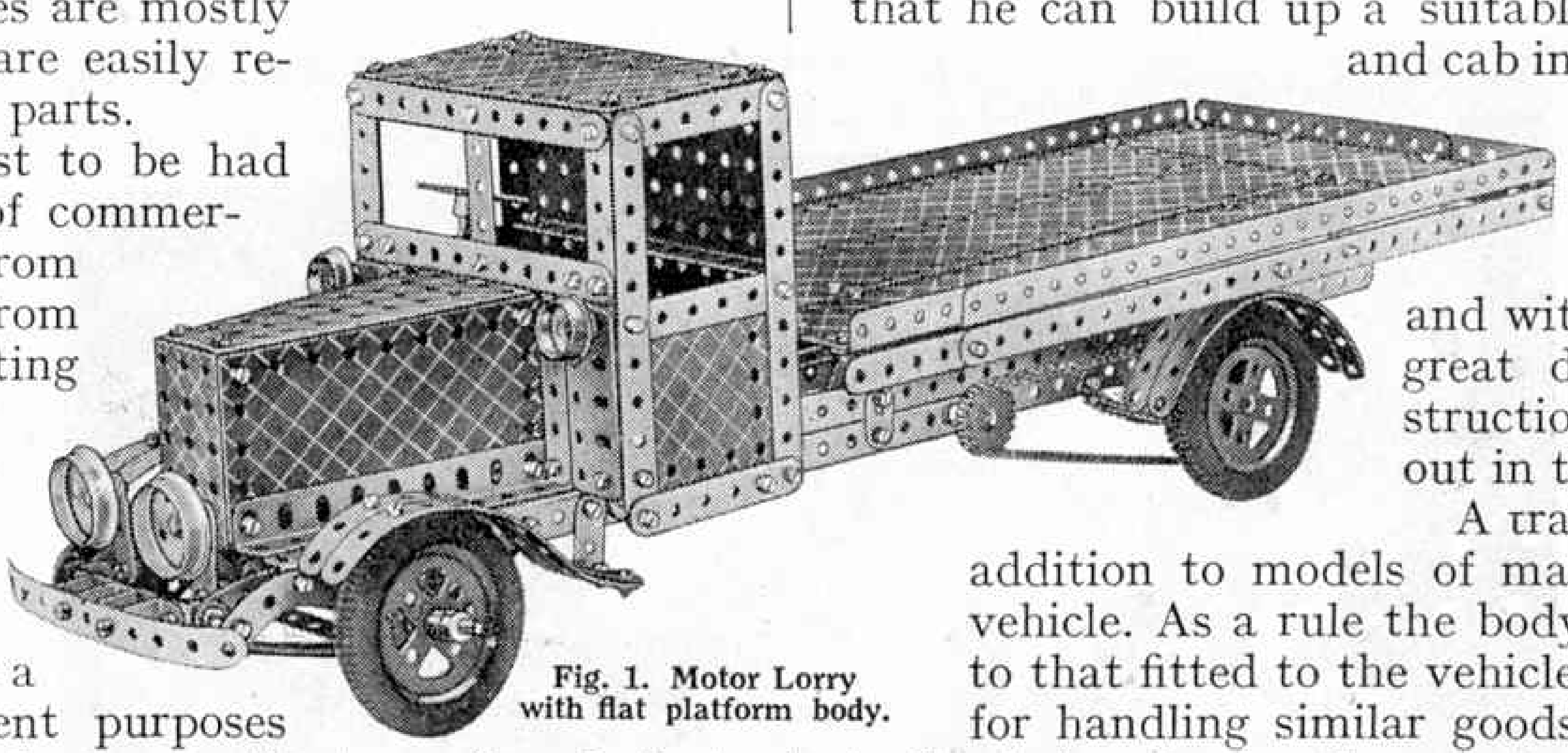


Fig. 1. Motor Lorry with flat platform body.

There is much interest to be had from the construction of commercial vehicles, as apart from the pleasure derived from designing and constructing them, there is the fun of operating them under conditions like those met with in actual practice. Motor vehicles are now built for a large number of different purposes and their design is dependent upon the type of work that is to be carried out. For many purposes the open lorry is largely used, and this may be in the form shown in Fig. 1, or may be provided with sides as in Fig. 2. The first type is used extensively for loads such as sacks and packing cases, and Meccano Loaded Sacks can be used to give the necessary touch of realism to the model. Meccano parts can be carried to represent different engineering parts, and cases of merchandise can be represented by blocks of wood or built-up crates.

The type of lorry shown in Fig. 2 is used for handling loose material such as sand and gravel, and the tipping body facilitates disposing of the material. In this case the rear end is hinged to allow the material to slide off the body. This method of tipping is the most common, but lorries are made also with a universal tipping movement to allow the body to be tipped at either side or at the rear. The usual method of operating the tipping mechanism in a Meccano model is to employ a Screwed Rod that is pivotally mounted at right-angles to a Rod journalled in the chassis. The pivoting of the Screwed Rod is necessary to allow for the swinging movement of the body, and the most satisfactory form of drive for operating the Rod is generally provided by Bevels or Contrate gearing. If the model is power driven, the Clockwork or Electric Motor can be made to operate the tipping mechanism by suitable control levers. Other forms of tipping gear can be arranged by means of levers or pulley systems, and the constructor will naturally fit the particular type of mechanism that is incorporated in the lorry he wishes to reproduce.

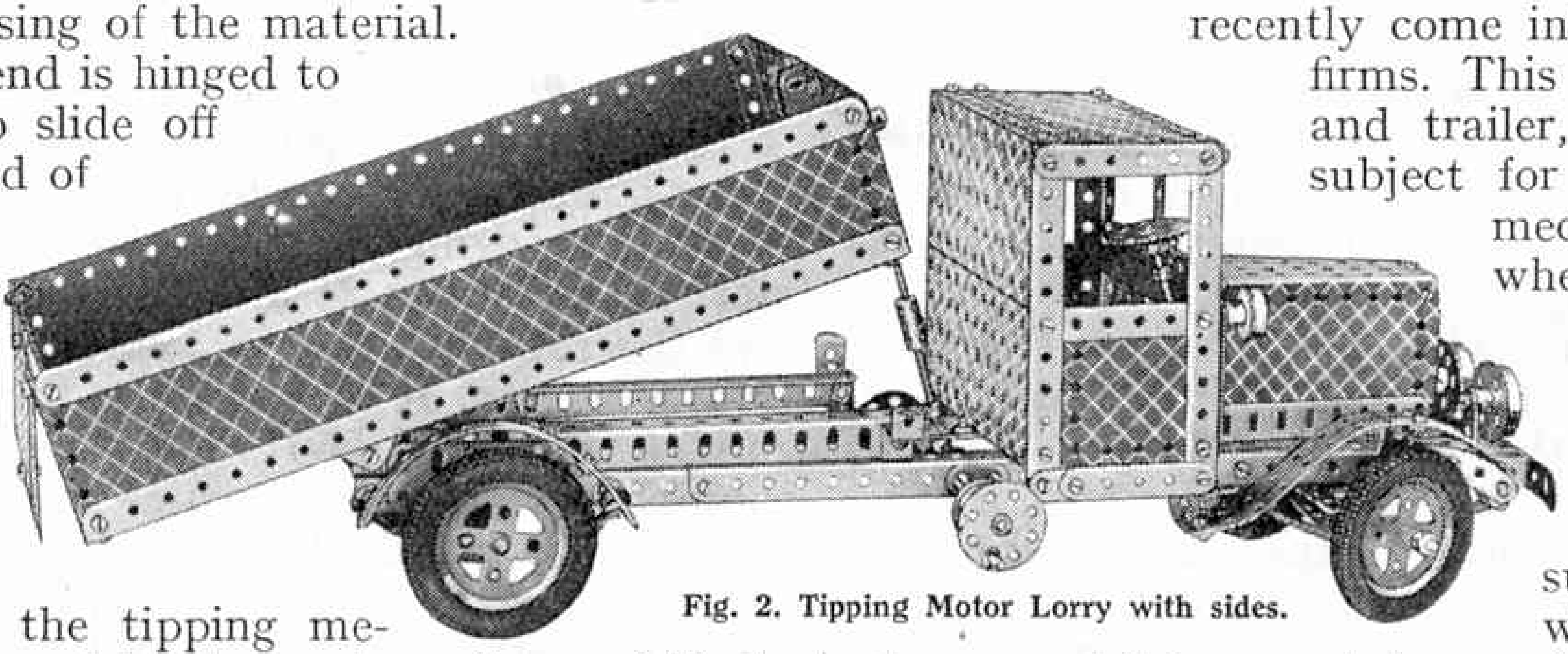


Fig. 2. Tipping Motor Lorry with sides.

It will be noticed that the general construction of the two models in Figs. 1 and 2 is very similar, the chief difference being in the bodies. In practice it is often the case that the same type of chassis and cab is used with different types of body, and the model-builder will find that he can build up a suitable chassis, fit the bonnet and cab in position, and afterwards provide a body. He can then completely alter the model by fitting a different type of body, and with one standard chassis a great deal of fascinating constructional work can be carried out in this way.

A trailer makes an interesting addition to models of many types of commercial vehicle. As a rule the body of the trailer is similar to that fitted to the vehicle drawing it, as it is used for handling similar goods. The construction of a trailer is far simpler than that of the motor vehicle, but although the design is quite straightforward, there is scope for interesting work in such extra fitments as automatic brakes that are applied when the trailer tends to overrun the motor. An open trailer is generally to be seen behind an open lorry, and a trailer with sides with a lorry having sides. Van trailers are used in conjunction with motor vans. The model-builder should construct the trailer on similar lines to the body of the model, and if he is observant he will be surprised to notice the great variety of trailers that are in everyday use on the roads.

For work over short distances a new type of vehicle has recently come into favour with transport firms. This is the mechanical horse and trailer, and it is a very good subject for a Meccano model. The mechanical horse is a three-wheeler that forms a tractor unit for trailers that are specially designed for the purpose. When fixed ready for towing, the trailer has its front end supported by the rear wheels of the mechanical horse, and it is mounted on a pivot so that the entire unit is similar to an articulated lorry. The mechanical horse has a single wheel at the front arranged to steer, and two wheels at the rear. The vehicle can easily be detached from its trailer, so that while one trailer is being loaded or unloaded, the mechanical horse does not remain idle but takes charge of another trailer. The trailers vary in design almost as much as the bodywork of vehicles of the more usual type.

A mechanical horse and trailer is shown in Fig. 4, and the tractor unit is shown separately in Fig. 5. As in actual practice, the trailer has a small pair of wheels mounted beneath the turntable at the front end, these wheels being used to support it and to facilitate moving it when the mechanical horse is not in position. The framework attached beneath the 3" Pulley of the turntable is fitted with two Angle Brackets at the front, and these Brackets engage a 2½" x 2½" Strip Plate at the rear of the mechanical horse. When the vehicle is backed on to the trailer the Angle Brackets are forced up the sloping Plate until they engage the upper edge. The bolts fixing the Angle Brackets rest on the Strip Plate, and in this position the Flanged Wheels of the trailer should be clear of the ground.

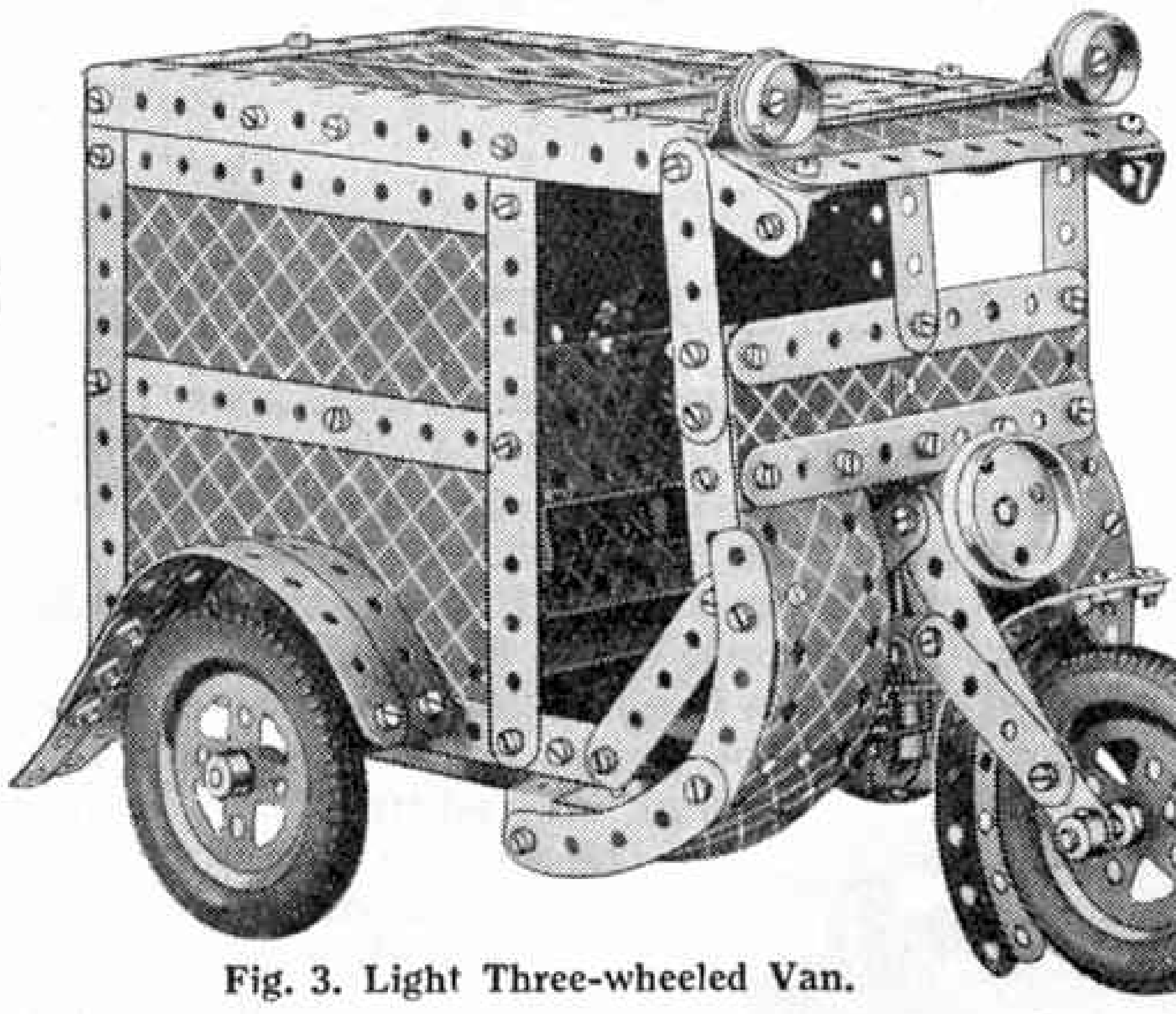


Fig. 3. Light Three-wheeled Van.

Motor lorries of the articulated type carry loads considerably greater than do four-wheeled vehicles, owing to the greater length of the body that can be fitted. Such subjects make good models, and other interesting types of heavy vehicle are the rigid six-wheelers and eight-wheelers. The former have two wheels at the front and four at the rear, the two rear axles being mounted on pivoted arms that allow for irregularities in the road surface. In eight-wheeled vehicles there are four wheels at the front and four at the rear, and an interesting problem for model-builders is the arrangement of the steering gear for the four front wheels. The object of having six or eight wheels instead of four is to reduce the actual weight carried on each axle, and considerably heavier loads than normal can be carried on the vehicle. As the weight on each wheel is so reduced, the vehicle can be used on soft ground without sinking in, and much smoother running is obtained over rough country than is possible with only four wheels.

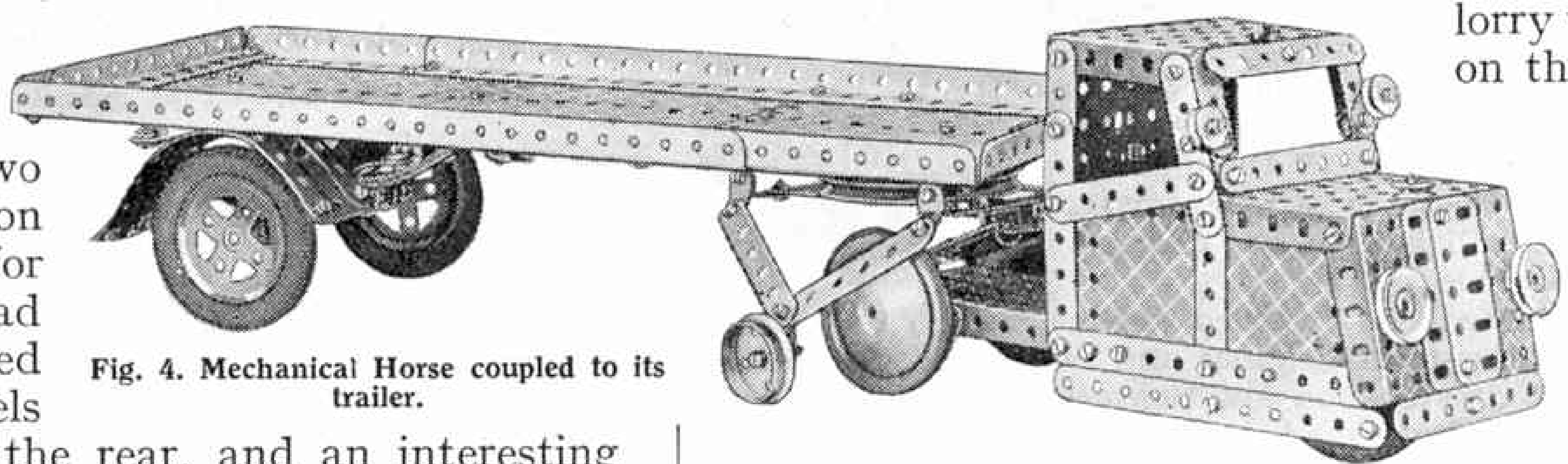


Fig. 4. Mechanical Horse coupled to its trailer.

In building a model the constructor will usually have in mind some definite make of vehicle of which the radiator and bonnet design should be reproduced as nearly as possible in order to give the model a characteristic appearance. The general lines of motor lorry bonnets and radiators are easy to reproduce with Meccano parts, and a typical example is shown in Figs. 1 and 2. Here the 2½"×1½" Flanged Plate is used for the radiator and a Sector Plate and Flexible Plates make the bonnet. The front of the mechanical horse is of quite different design and has been well reproduced in the model shown in Fig. 4.

A totally different appearance is produced in the "forward control" vehicles in which the driver's cab is set forward over the engine in order to allow more space for the body. A short bonnet may project from the cab, and in some cases the radiator is mounted immediately on the front of the cab so that the vehicle presents a very flat-fronted appearance. Some vehicles fitted with forward control have a small cab to accommodate the driver only, this being fitted on the right-hand side of the bonnet.

In addition to the common forms of vehicle familiar to all, there are many types that are designed for special purposes, and as these are somewhat unusual they are generally of more interest to the model-builder. Van bodies may be of the conventional box-like shape, or they may be extended forward at the top so that the space above the driver's cab can be utilised for carrying loads. Loads such as milk churns and barrels are usually carried in two tiers, the upper platform being extended above the driver's cab. The cab top itself may form part of the platform, or the platform may be a separate structure supported by bracing Rods that extend from the front down to the chassis Girders. Two platforms are used also for carrying sheep and pigs. In this case the sides of the lorry are made up of laths somewhat in the manner of a cage, and at the back of the lorry is a large board that lets down for loading or unloading the animals, and can be pulled up to form the back of the vehicle for both upper and lower platforms.

Tank wagons form a separate class of commercial vehicle and are to be seen in a number of different designs. The large articulated tank wagons have four wheels at the rear mounted on compensating beams attached to the tank itself, which is not supported by any platform or girder work. The front of the tank is pivoted on the lorry in the usual way for an articulated vehicle. Some of the wagons in this class are very similar to an ordinary motor lorry with a tank fitted on the platform body, whereas others have the tanks mounted between lockers that are used for carrying the hosepipes necessary for emptying the tanks. In many cases the tanks are of oval section instead of the older cylindrical type, and modern tank wagons have very attractive lines. In tank wagons alone the constructor will find much subject matter for new models, and when a model of this type is completed there is still the possibility of adding a trailer of an additional tank.

The tendency to reduce delivery costs to a minimum is responsible for the introduction of extra light vans and trucks for handling parcels and light loads. These vehicles are of the three-wheeled type and are generally powered by an air-cooled engine of the motor-cycle type. A typical light van in this class is shown in Fig. 3, from which it will be seen that the front wheel is mounted in forks such as are fitted to a motor-cycle. In some of these vans the driver sits in a saddle and steers the vehicle by a pair of handlebars, but the later types are mostly fitted with proper seats and steering wheels.

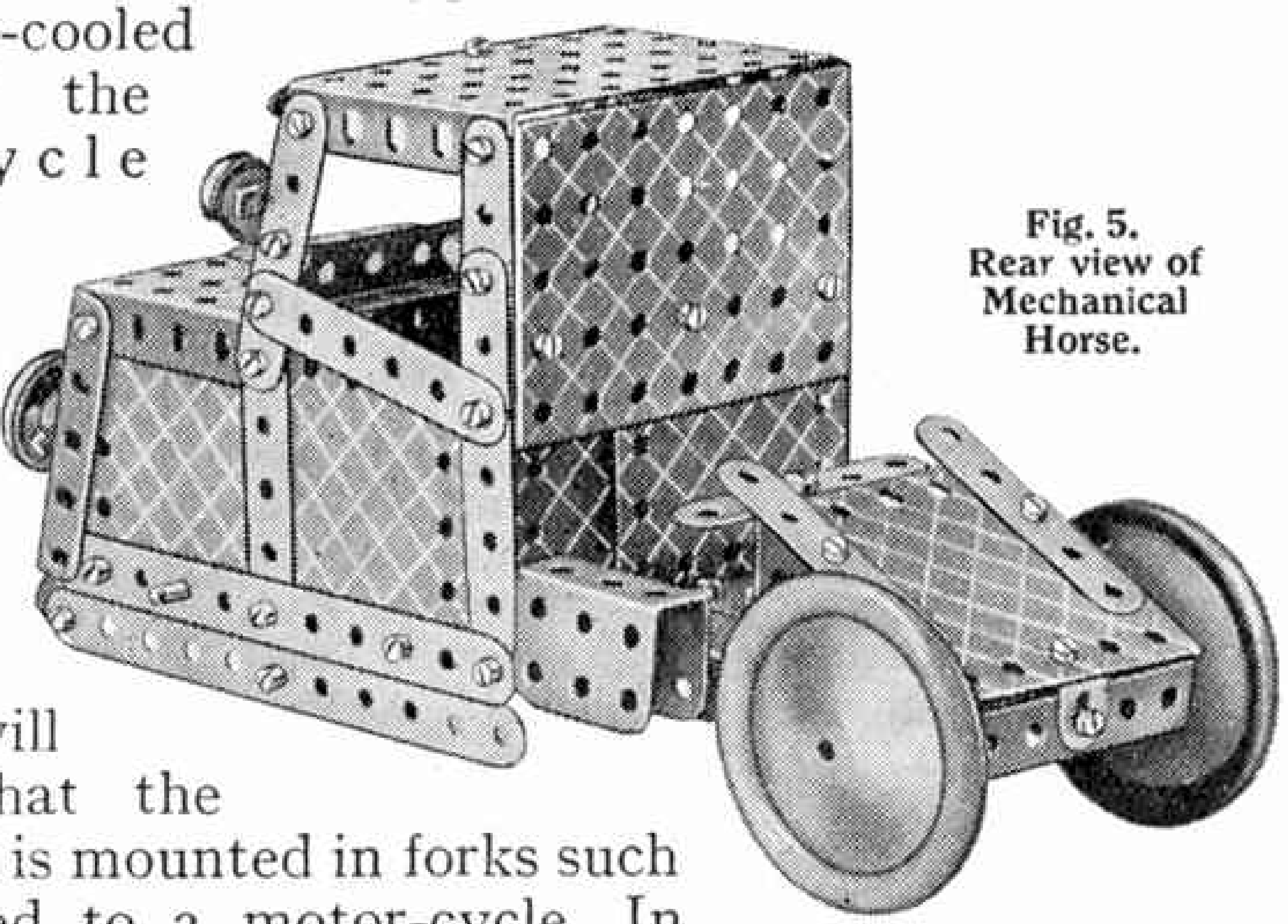


Fig. 5. Rear view of Mechanical Horse.

A Chance for Owners of Small Outfits

Prizes for Simple Meccano Models

Many enthusiastic Meccano model-builders have written to me recently about the competitions announced on this page each month. From this correspondence I find that many boys who would like to take part in these contests refrain from doing so simply because they have only small Outfits. Consequently they think that the simple models they are able to build will not stand much chance of winning a prize if they have to compete against elaborate models built by boys with large Outfits at their disposal.

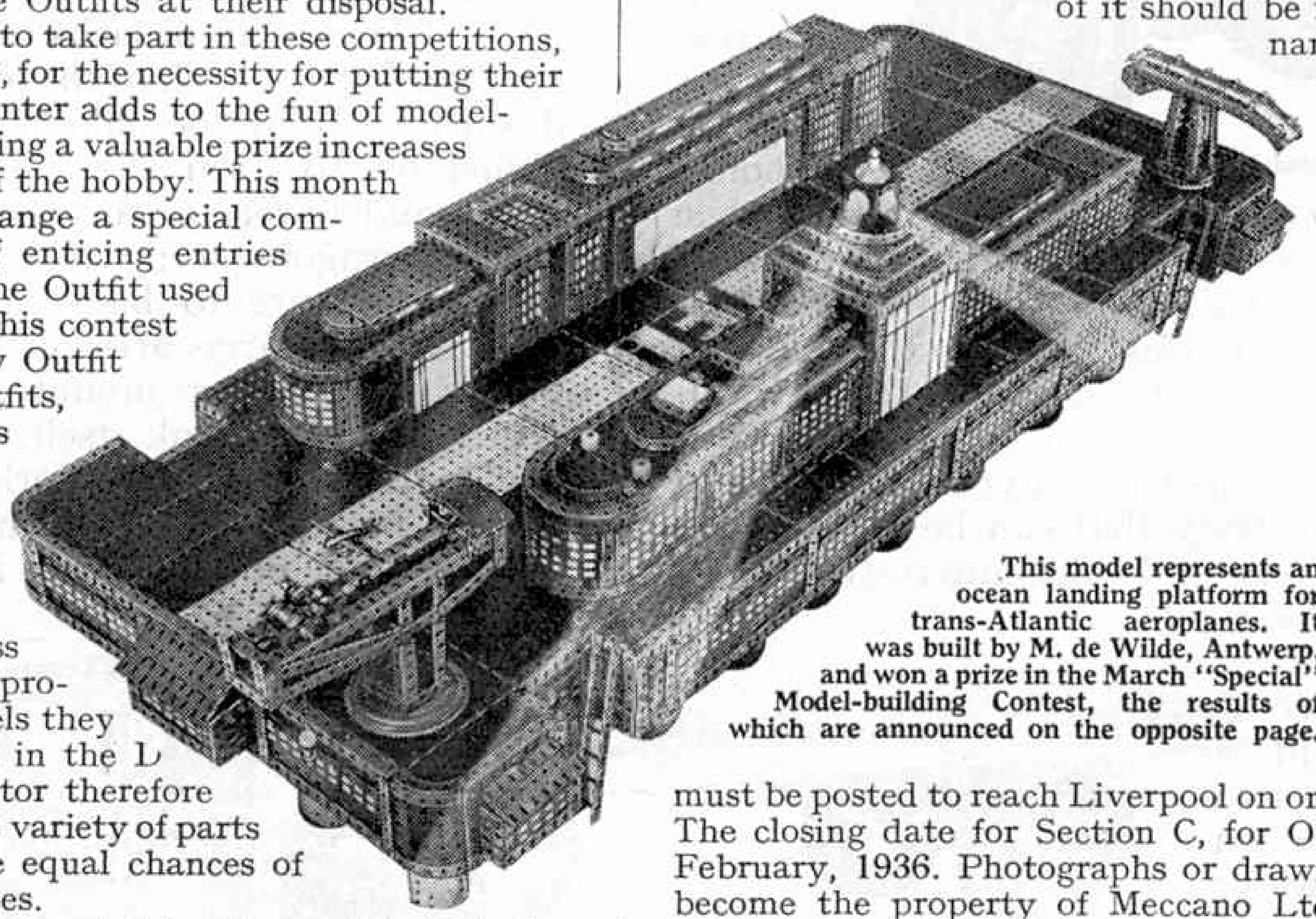
I want all Meccano enthusiasts to take part in these competitions, whatever the sizes of their Outfits, for the necessity for putting their best work into the models they enter adds to the fun of model-building and the prospect of winning a valuable prize increases the excitement and fascination of the hobby. This month therefore I have decided to arrange a special competition with the sole object of enticing entries from owners of small Outfits. The Outfit used in building models for entry in this contest must not be larger than the new Outfit D or one of the old No. 2 Outfits, and any model that incorporates more parts than are contained in either of these Outfits will be disqualified. It is not necessary to use all the parts contained in the Outfits, however, and those boys who possess larger Outfits may compete provided that in building their models they do not use any parts not found in the D or No. 2 Outfits. Every competitor therefore will have approximately the same variety of parts at his disposal and all will have equal chances of winning the most valuable prizes.

A fine range of prizes will be awarded for the models that the judges consider to be the most original and which are the best built as regards sound construction and neatness.

Any model, no matter how small and simple it may be, will stand a good chance of winning a prize if it represents an unusual subject, and I advise competitors to select their subjects very carefully and to go to some trouble to find a really novel idea. Models of any kind whatever are suitable for this competition, so there should be no difficulty in finding attractive subjects.

Entries will be divided into the following sections: A, for competitors over 12 years of age living in the British Isles. B, for competitors under 12 living in the British Isles. C, for competitors of all ages living Overseas. The prizes to be awarded in each Section are listed in the panel at the foot of this page.

In sending in their entries competitors should pay particular attention to the following instructions. When the model is finished, it should be photographed, or if this is not possible a good drawing of it should be made. The competitor's age, name and address should then be written on the back of the photograph or drawing, together with letter A, B, or C to indicate the Section for which the entry is intended. A list of the parts used in building the model also must be attached to the photograph. Failure to observe this condition will lead to disqualification of an entry.



This model represents an ocean landing platform for trans-Atlantic aeroplanes. It was built by M. de Wilde, Antwerp, and won a prize in the March "Special" Model-building Contest, the results of which are announced on the opposite page.

Envelopes containing entries should be addressed to November "Outfit" Model-building Contest, Meccano Ltd., Binns Road, Liverpool 13. Those for Sections A and B must be posted to reach Liverpool on or before 31st December, 1935. The closing date for Section C, for Overseas competitors, is 29th February, 1936. Photographs or drawings of prizewinning models become the property of Meccano Ltd., but unsuccessful entries will be returned if a stamped and addressed envelope of the correct size is enclosed with the entry for that purpose.

Competitors who live outside the British Isles should make a special effort to enter this Contest. Every competitor has the same chance of carrying off a prize, whether he lives 10 miles or 10,000 miles from Liverpool. The Overseas closing date is two months later than that of the Home Sections, so that competitors abroad have plenty of time in which to prepare their entries. Although all Overseas competitors are grouped into one Section, the age of each entrant is taken into consideration when awarding the prizes.

"Aeroplane Constructor" Model-Building Contest

In this Contest prizes are offered for the most original models of aeroplanes built from the parts contained in the Meccano Aeroplane Constructor Outfit. Competitors may choose any type of aeroplane or seaplane for their subject, but the model must be built from Meccano Aeroplane Constructor parts. Competitors who possess an ordinary Meccano Outfit may introduce a few standard Meccano parts if they wish, but the principal portions of the model must be made with the Aeroplane Constructor parts.

Competitors should send in either a photograph or a drawing of the model, and the actual model must not be sent. Photographs or drawings of prizewinning models become the property of Meccano Ltd. Unsuccessful entries will be returned, provided that a stamped addressed envelope is enclosed with the entry.

Since the first Aeroplane Constructor Outfits were introduced, several new parts have been added, and competitors who wish to bring their Outfits up to date should ask their dealers for our latest price lists. Competitors must not, of course, copy the models illustrated in the Aeroplane Constructor Manuals, but should select for themselves a suitable prototype, and then reproduce it as closely as possible with Aeroplane Constructor parts. Hundreds of illustrations of real aeroplanes that will make fine subjects for this Contest have appeared from time to time in the "*M.M.*" The more closely a model resembles the actual aeroplane on which it is based, the greater will be its chance of winning a prize.

There will be two Sections—A, for competitors of all ages living in the British Isles; B, for competitors of all ages living Overseas. In each Section a separate set of prizes, as indicated in the accompanying panel, will be given for the most interesting and original models.

Competitors must write their age, name and address on the back of each photograph or drawing sent in, and must enclose a short description of the model.

All entries must be addressed November "Aeroplane Constructor Contest," Meccano Ltd., Binns Road, Liverpool 13.

Entries for Section A must reach this office before 31st December, 1935. The closing date for Section B is 29th February, 1936.

"Small Outfits" Model-Building Competition

The Prizes

The following prizes will be awarded in each Section:

First Prize: Meccano or Hornby Goods value £2-2-0.
Second Prize: Meccano or Hornby Goods value £1-1-0.
Third Prize: Meccano or Hornby Goods value 15/–.
Five Prizes of Meccano or Hornby Goods value 10/–.
Five Prizes of Meccano or Hornby Goods value 5/–.

A separate and complete set of prizes will be awarded in each Section.

"Aeroplane Constructor" Competition

The following prizes will be awarded in each Section:

First Prize: Meccano or Hornby Goods value £1-1-0.
Second Prize: Meccano or Hornby Goods value 15/–.
Third Prize: Meccano or Hornby Goods value 10/–.

Model-Building Competition Results

By Frank Hornby

Prizewinners in Recent Contests

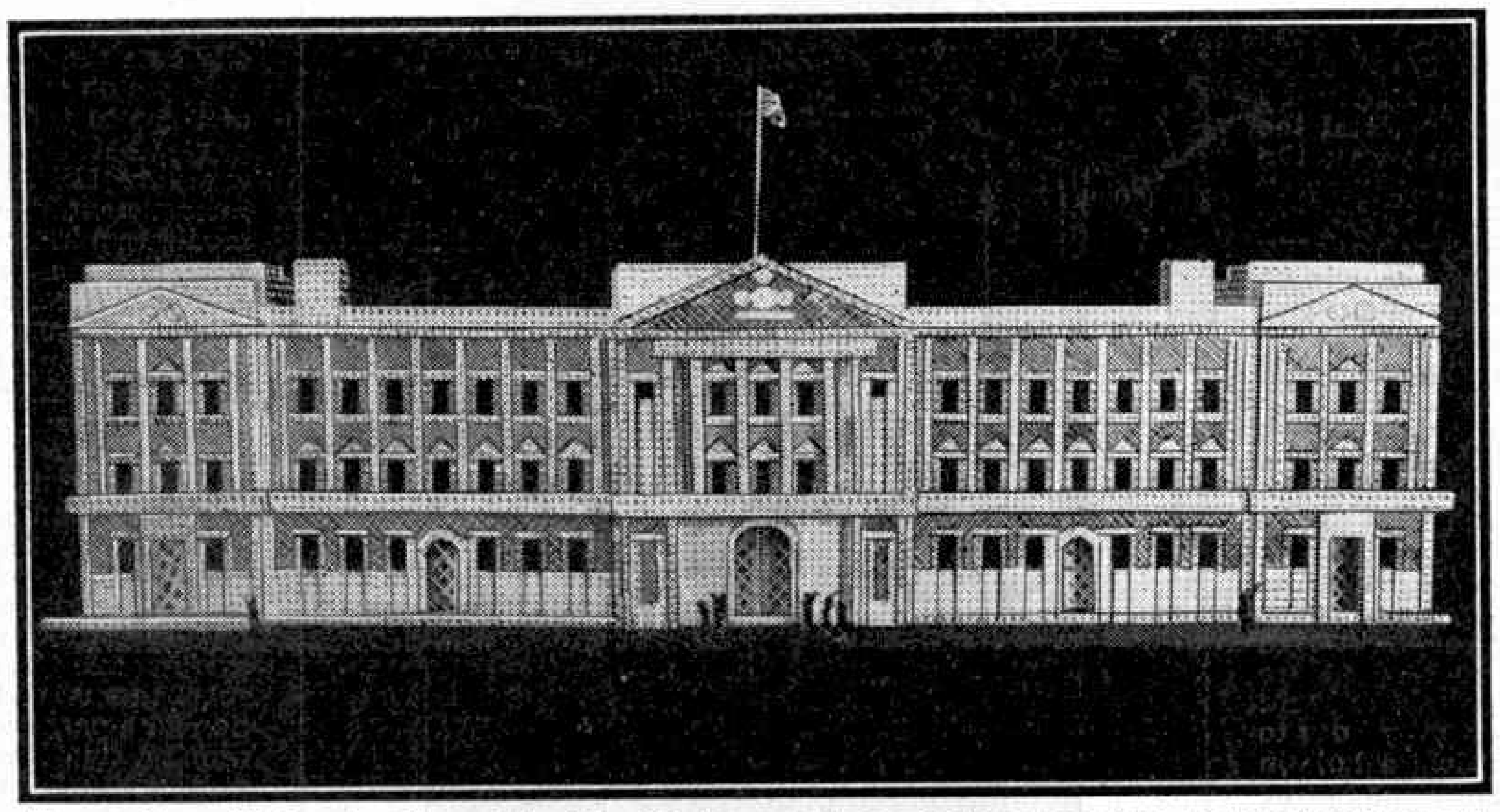
March "Special" Contest (Overseas)

The list of prizewinners in Section B (Overseas) of the March "Special" Model-building Competition is as follows:

Five competitors obtained over 75 points and therefore share goods value £8 in proportion to the points gained: F. Voskuyl, Soestdyk, Holland (88 points) £1/16/6; D. Murison, Buenos Aires (80 points) £1/12/6; M. de Wilde, Antwerp, Belgium (78 points) £1/11/6; J. Philipson, Dandenong, Australia (78 points) £1/11/6; M. Malchow, Stavely, Alberta (77 points) £1/11/–.

The following competitors obtained between 65 and 74 points and receive proportionate shares of Meccano or Hornby goods value £4: D'Arcy Graham, Edmonton, Alberta (70 points) 13/6; A. Brunton, Gisborne, New Zealand (68 points) 12/6; R. Latimer, Rangoon, Burma (67 points) 12/–; F. Barry, Ocean Falls, British Columbia (67 points) 12/–; Miss S. Das Gupta, Faridpur, Bengal (65 points) 11/–; H. Stapleton, Wanganui, New Zealand (65 points) 11/–; W. Visser, Malang, D.E.I. (65 points) 11/–.

A neatly constructed model of an automatic coin-in-the-slot machine for photographic films, was built by F. Voskuyl. The model obtained 45 points for construction, a total that was equalled by only one other model entered in the contest. The mechanism of the model is of Voskuyl's own design and works very well. There are two drawers for two different sizes of films and one coin slot. When a coin is placed in the slot two electric bulbs are lighted, and these illuminate plates on which the sizes of the films issuing from each drawer are stated. Each of the drawers can be pulled out separately, but the two cannot be opened together. The mechanism is operated by means of an electric solenoid.



The realism of this splendid model of Buckingham Palace will be apparent to readers familiar with the appearance of the actual building. It is the work of A. Fear, Exeter.

The models submitted by D. Murison and M. de Wilde are of particular interest as they demonstrate the possibilities of using Dinky Toys in conjunction with Meccano. D. Murison's model is a clever representation of a vehicular ferry of a type common on South American rivers. The model was built with the idea of using it in conjunction with Meccano Dinky Toy Motor Cars, and has accommodation for 28 of these miniatures. The model sent by M. de Wilde is an Atlantic aeroplane landing platform of the kind illustrated in the "*M.M.*" for January 1929. It is a more ambitious effort than either of the models previously mentioned, and is complete with Dinky Toy Aeroplanes and two seaplane catapults.

J. Philipson's model is a ship of the type used for transporting locomotives. It is 2 ft. 9 in. long and 5½ in. in beam, and in the hold it has accommodation for a Hornby locomotive. An interesting point is a Worm hung from the top of the foremast to represent a navigation light. Bent Rods, with Collars to represent pulley sheaves, make realistic davits.

A model threshing machine and tractor sent by M. E. Malchow pleased me very much. The thresher is a careful working reproduction of an actual machine. The threshing is done by beaters, and high speed fans blow the unwanted chaff down a chute and out of the machine.

Among the competitors obtaining between 65 and 74 points, and therefore sharing a prize of £4, is D. Graham. His model represents Sir Malcolm Campbell's famous racing car "*Blue Bird*." The car is well designed, but realism is lost by the use of Strips for the bodywork, which in consequence does not look sufficiently solid.

The prize-winning models in this section also include an orrery, operated by a 6-volt Meccano Motor, that was sent by A. N. Brunton. Current is supplied to the motor from an accumulator through collector shoes. An electric lamp is placed inside a glass sphere that represents the Moon, and the model is very attractive when set to work in a darkened room. It can be used to demonstrate the seasons of the year and eclipses of the Sun and Moon.

"Architectural" Competition (Home)

This competition was open only to models of architectural subjects, such as public buildings, houses, churches and castles. Competitors were allowed to use any number and variety of parts in building their models, and each competitor's age was taken into consideration in judging the entries, and the contest attracted a large number of entries of very high quality. The list of prizewinners is as follows:

Four competitors obtained over 75 points and share goods value £8 in proportion to the points gained: A. Fear, Exeter (88 points) £2/4/–; W. Halsall, Burscough (80 points) £2; E. Clements, Farnborough (79 points) £1/19/6; R. Hilling, Ipswich (77 points) £1/18/6.

The following competitors obtained between 65 and 74 points and receive proportionate shares of Meccano or Hornby goods value £4: J. McGowan, Allanton, Shotts (71 points) 12/–; P. Bunce, Harpenden (68 points) 11/6; J. Kennett, Richmond (68 points) 11/6; W. Kirshner, Romford (68 points) 11/6; C. Lynch, Clifton, Yorks. (68 points) 11/6; S. Wotherspoon, Waterloo (68 points) 11/6; P. Le Fevre, Harleston (65 points) 11/–.

Among the many fine models submitted the most outstanding is one that won a prize for A. Fear. It is a very pleasing reproduction of Buckingham Palace, and is illustrated on this page. It is only when the illustration is compared with a photograph of the actual building that the full beauty and good construction of the model are appreciated. The front of the model is built chiefly of Angle Girders, Flat Plates and Strip Plates, and the ornamental work is carried out with Pulley Wheels, Bush Wheels, Braced Girders and Strips. The Pulleys and Bush Wheels are used to form the ornamental crests and the Braced Girders for the doors. Strips are used to make the window frames and the pointed portions above them. The model obtained a total of 88 points, 48 of which were awarded for good construction.

W. Halsall obtained 80 points with a model of a church that incorporates a finely-tapered spire built of Angle Girders and Strips. The walls of the model are constructed of Flat Girders and Plates, and realistic arched windows are made of Curved Strips. Buttresses often are conspicuous features of churches, and the model is well provided in this respect. The buttresses incorporated are made of 12½″ Strips, and are judiciously distributed around the walls to give an appearance of solidity.

E. Clements' model reproduces the facade of a mansion at Sevenoaks, Kent, and is complete in every essential detail. Clements sent with his entry a photograph of the actual building, and on comparison of this with the model I find very little in the latter to criticise adversely.

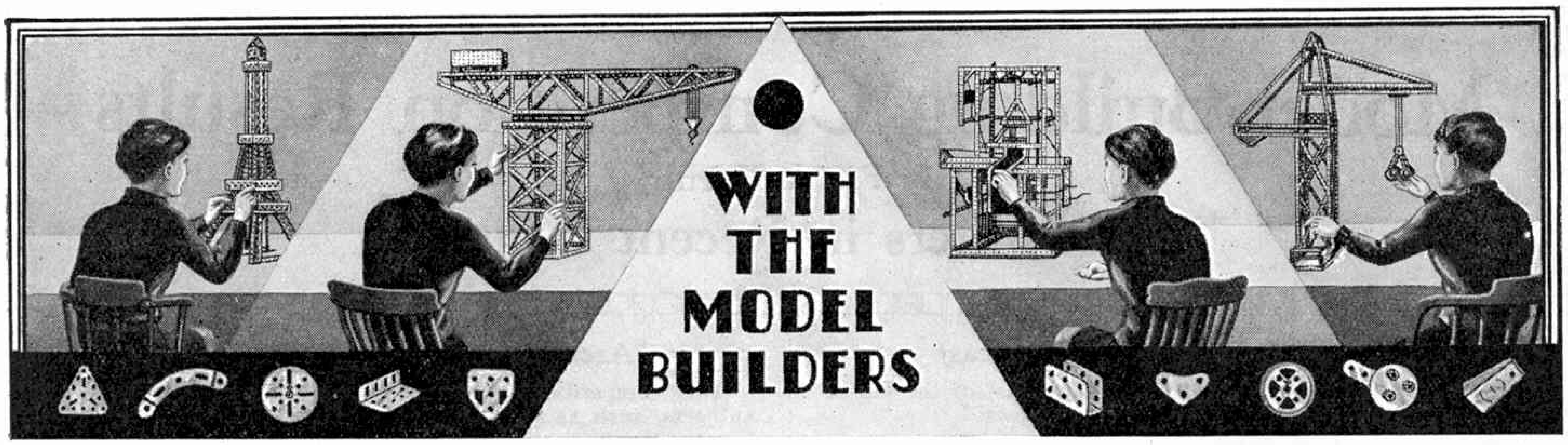
A mansion also forms the subject of the model sent by R. Hilling. With the exception of the roof, which is made of paper, the model is built entirely of standard Meccano parts.

June "Lynx Eye" Competition (Home)

A large number of competitors succeeded in solving all the pictures on page 370 of the June 1935 "*M.M.*" and the judges therefore decided to award the prizes in order of merit to the all-correct entries that were most neatly prepared. The awards are:

1st, Meccano or Hornby Goods value £2-2.: D. Morley Davies, Maesteg, Glam. 2nd, Goods value £1-1s.: K. Costain, Bolton, Lancs. 3rd, Goods value 10/6: G. Burgess, London, N.12.

Meccano or Hornby Goods value 2/6: E. Gibbins, Leicester; D. Gibson, Paisley; M. Noyes, Bishop's Stortford, Herts.; R. Perkins, Luton, Beds.; S. Smith, Enfield, Middlesex; R. Warren, East Grinstead, Sussex; R. Webb, Wickford, Essex; C. Wrayford, Moretonhampstead, Devon.



WITH THE MODEL BUILDERS

AMUSING ANIMATED MODELS

Models of figures or animals that are made to carry out some movement in a lifelike manner are very fascinating and often amusing in operation. Such subjects are not difficult to build, and they provide a pleasant diversion from the more serious side of model-building.

Some good examples of mechanicians that are made to carry out various operations appear in the Meccano Instruction Manuals, and these serve to show how different movements of the figures can be arranged. Several simple models that are very effective are shown for Outfit C. These include a Blacksmith who brings down his heavy hammer on the Meccano anvil; an Invalid who propels his own bathchair along the ground; and Gymnasts who carry out athletic feats. For Outfit B are shown two somewhat different types of model in which movement is given to the figures by pulling on two Strips. One of these models, the Bucking Broncho, is of a horse and rider, the horse being made to throw its rider over its head, merely by pulling on two Strips. This is very amusing, and the movements are quite lifelike. In a similar way the Pecking Hen is made to peck at a bowl of "food."

A variation is provided by the Ancient Motor Car shown for Outfit G. The car is made to steer erratically and at the same time wobble violently from side to side, but the attraction of the model centres on the two figures seated in the car. The driver is apparently endeavouring to regain control of the vehicle as it wobbles about, and the passenger gets jerked about in the back of the car! This effect is produced by connecting the driver's arms to the steering wheel, which is turned to and fro by the Clockwork Motor; and the passenger is mounted on a Spring, which thus allows the figure to swing from side to side.

Springs are useful in a number of cases for producing movement in different figures. For instance, in a small model such as a cake-walk, Dinky Toy Passengers can be mounted on Compression Springs so that as the floors rock to and fro the figures are jerked backward and forward on their Springs. To fix the Dinky Toys to Compression Springs it is necessary to drill a hole in each base to accommodate a Meccano bolt. The Spring can then be pinched to fit the shank of the bolt, and also to fit a bolt projecting from the floor.

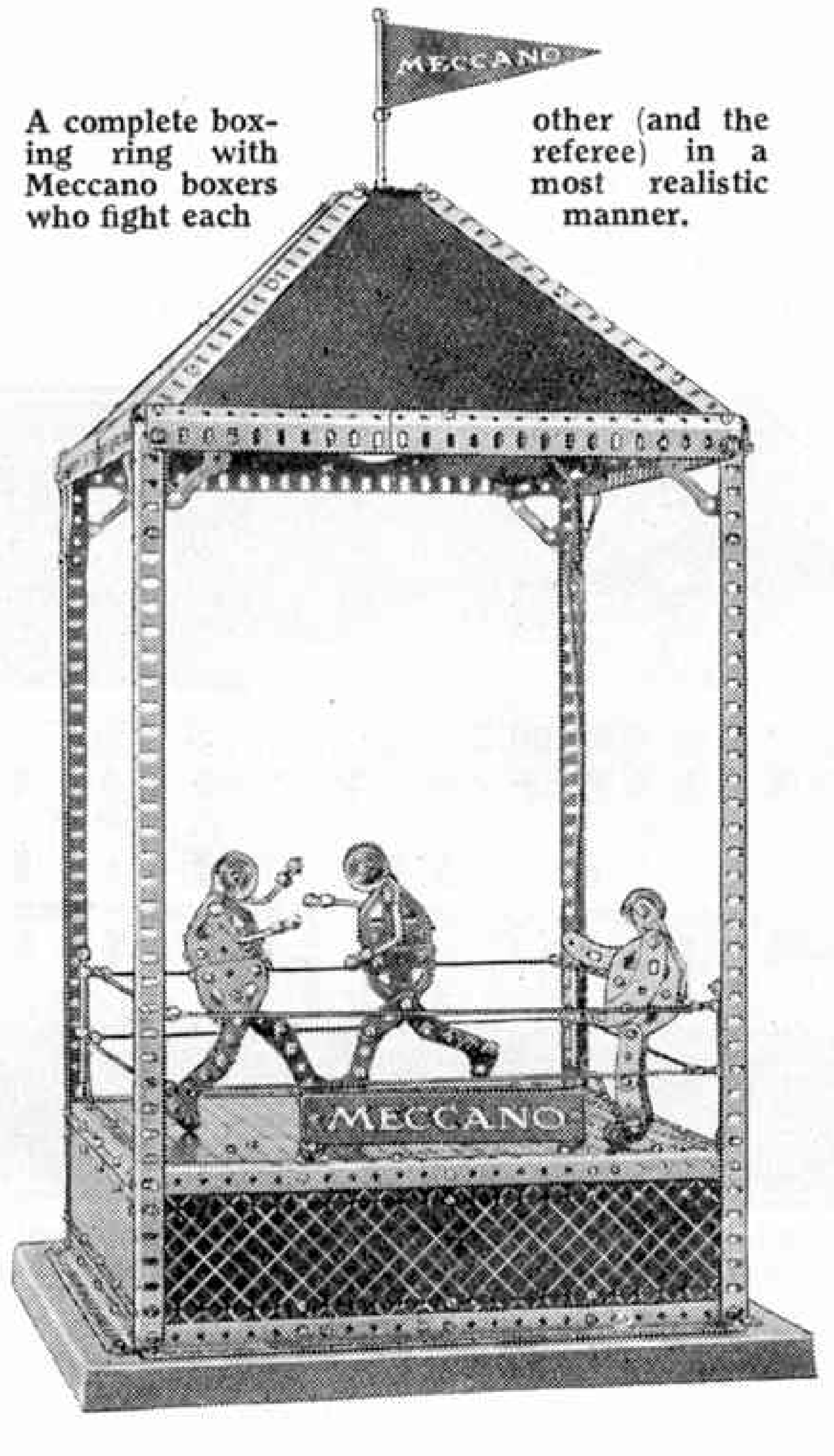
There are many ways in which movement can be given to the mechanicians, animals, etc., and model-builders who are looking for a subject for their next model should try building one on these lines, as there is much scope for originality and ingenuity. A good subject would be a model fairground with roundabouts, joy wheels and flyboats, etc., and the numerous side shows. This type of model provides good opportunities for the introduction of working figures that greatly enhance its interest.

THE MECCANO BOXERS

A particularly fascinating model is featured in the illustrations on this page. The model is of a somewhat unusual subject, and as the upper illustration shows, represents a boxing ring with the two contestants in distinctly lifelike attitudes, while the referee watches the proceedings. The model is most realistic in operation. The figures move together and spar vigorously, swinging their fists at each other's heads, and changing positions at intervals as though to avoid the blows. The complete absence of external mechanism makes the model more interesting as the method of operation cannot be seen, and the realism is enhanced by the irregularity of the movements. The two figures close together or separate, and swing round in circles without any regular sequence to their movements, this lack of timing making it difficult to realise how the mechanism is arranged.

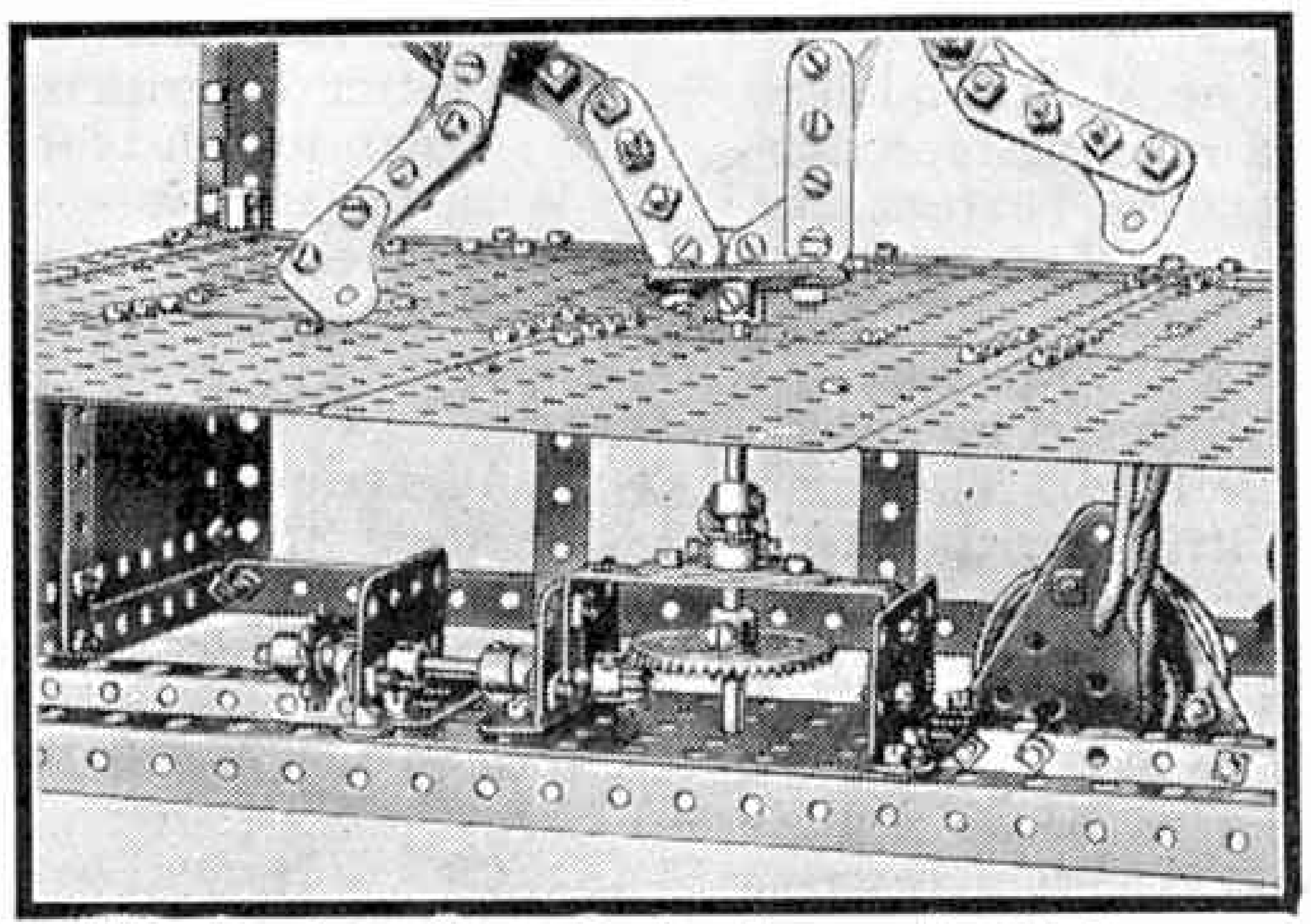
The mechanism actually is exceedingly simple, the essential parts being shown in the lower illustration. A vertical Rod is mounted in suitable bearings on the base, and carries a Double Arm Crank at its upper end. This Rod can be driven in any suitable way from the Motor, but in the illustration Bevel gearing and Sprocket drive are employed. Another Rod is inserted in the round hole of the Double Arm Crank and is passed through the hole in the floor of the boxing ring directly above the lower Rod, so that it is inclined at an angle to the vertical. On account of this inclination it will be necessary to enlarge the hole slightly. A Collar prevents the upper Rod from slipping through the Double Arm Crank and another Crank is fixed at the top of the sloping Rod.

When the Motor is set in motion a rocking movement is imparted to the upper Double Arm Crank, and it is this rocking movement that causes the figures to spar together in such a lifelike manner. The method of fixing the legs can be seen in the lower illustration, the right-hand figure being attached rigidly to the Crank. Both legs are fixed absolutely rigidly to each figure, and they are strengthened by extra Strips to ensure that they do not bend at the joints. The left-hand figure is pivoted to the 1½" Girder carried on the Double Arm Crank, and as one leg of this figure is constantly bearing on the Flat Plates of the floor, the figure moves only slightly as the Double Arm Crank rocks to and fro. The other figure, however, is jerked forward or backward by the rocking movement of the Crank.



A complete boxing ring with Meccano boxers who fight each other (and the referee) in a most realistic manner.

There is no drive to impart rotary movement to the oscillating Rod, but it will be found that when the model is in operation the figures sometimes swing round on the Rod and change their positions in a natural manner.



This view shows the mechanism for operating the boxers.

INTERMITTENT MOTION

The boxers can be made to work continuously by driving them with a Meccano 6-volt or 20-volt Electric Motor. Further realism can be added if they are set to work intermittently so that they pause at intervals as though to recover before making renewed onslaughts. If a Transformer is used for the current supply, an ingenious method of obtaining intermittent motion without the use of gearing is to arrange a flasher between the house mains and the Transformer. A flasher, which can be obtained from electrical stores, plugs into the electric light socket and is provided with a socket into which the transformer adaptor is plugged. When the current is switched on, a short interval must be allowed for the flasher to complete the circuit, thus starting the Motor. The flasher automatically cuts the current off at intervals and after a pause switches on again, so that the effect of introducing one of these to the model is to cause the figures to make pauses between their sparring bouts, as would be the case in real life. The possibilities of flashers for providing intermittent motion are worth investigation when a model requiring such a movement is under consideration. In cases where definite timing of the intermittent motion is necessary in relation to other movements, the flashers cannot be used, and gearing will be found necessary, but for giving intermittent pauses to a model the flashers are most useful.

RAIL ADAPTORS

Experienced model-builders know that Meccano parts can often be applied to serve purposes quite different from those for which they are generally intended. When difficulty is experienced in selecting a part for fulfilling a particular purpose, it is always advisable to go through the entire list of Meccano parts to see if any existing one will do what is required, before a built-up substitute is made. An instance of an unusual application for a part occurred recently in a model workshop in which a small figure of a mechanician was to be set to work with a hacksaw. The difficulty in this case was to find a part small enough to represent the saw, and it was ingeniously overcome by the use of a Rail Adaptor. These parts are intended for joining Meccano Strips to Hornby Rails, one of them being provided with a socket and the other with a plug. The part with the plug was used to represent the hacksaw, and served the purpose particularly well.

In addition to their intended uses, the Rail Adaptors can be used in cases where it is required to allow provision for quickly detaching a part of a model. They can be used also as plugs and sockets for making electrical connections, but they are not so satisfactory as the special plugs and sockets supplied for this purpose, and consequently should be used only in cases of necessity.

INSERTING AWKWARD BOLTS

Different schemes have been put forward from time to time for inserting nuts and bolts in awkward positions. The simplest of these is to magnetise the blade of the Screwdriver so that the bolt is held in position on the end, but this method has the disadvantage that the bolt becomes magnetised and tends to leave the Screwdriver and attach itself to some part of the metal structure. Consequently it is not easily inserted in a hole. A simple method of dealing with the problem has been put forward by E. Holden (Coulsdon North, Surrey), who relies on a small piece of Plasticine for holding the bolt on the end of the Screwdriver. When the bolt has been inserted in place and tightened up, the Screwdriver is withdrawn, bringing the Plasticine with it. Wax or some other suitable substance can be used instead of Plasticine, but the latter will be found more suitable if available, owing to its plastic nature.

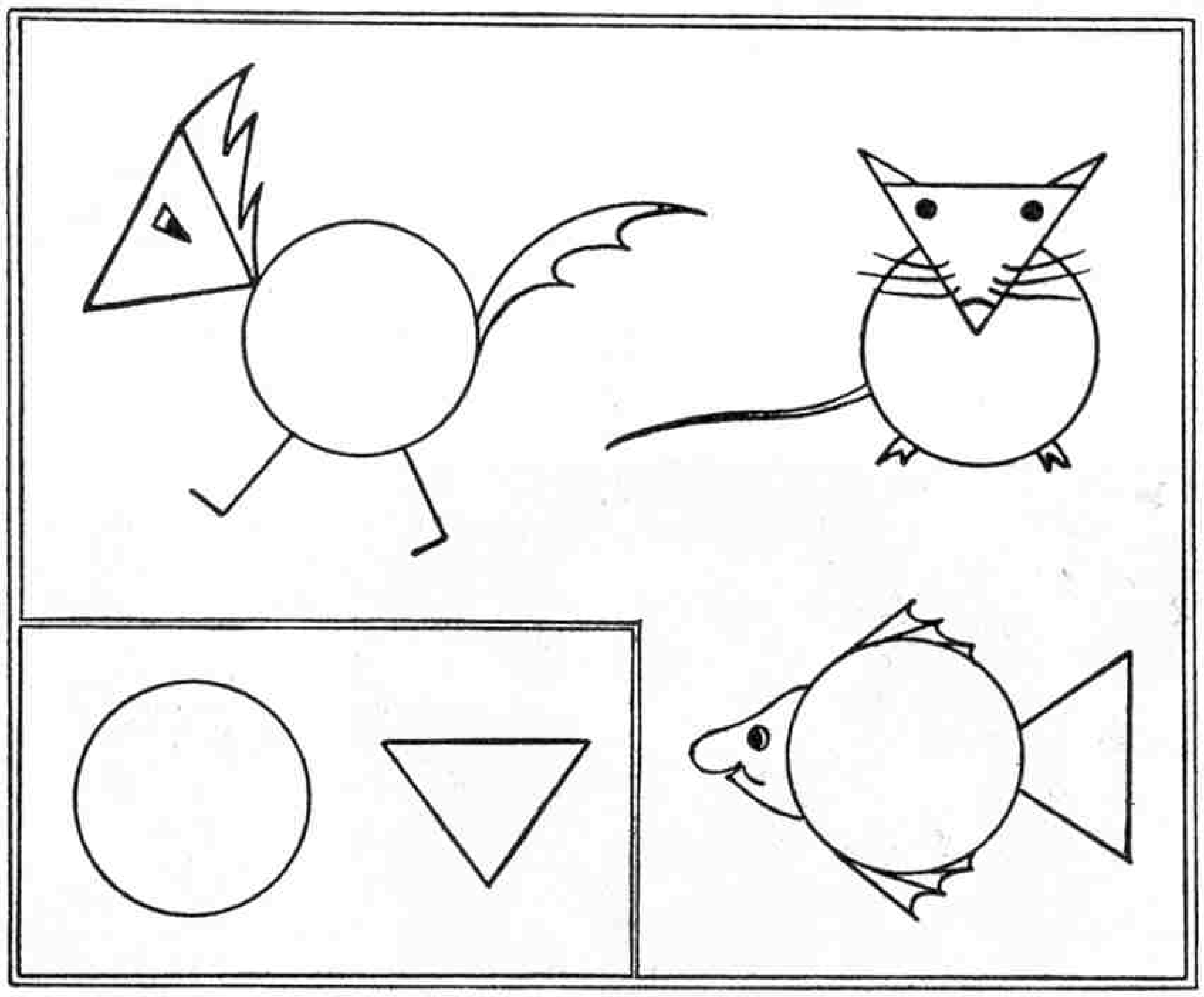
COVER FOR MECCANO FAN.—This proposal is for a close-fitting cover to totally enclose the Fan (No. 157), and having extensions to which rubber tubes can be fitted for leading to any part of a model. In certain models such a device may be useful, for instance in model printing machines the suction from the Fan could be used for lifting the sheets of paper to be fed to the rollers. There are few cases where the Fan could be applied to any useful purpose in this way, however, and there is little justification for introducing a special part. (*Reply to R. Tompkins, Wolverhampton.*)

Competition Corner

A NEW SKETCHOGRAM CONTEST

The Sketchogram competitions that have been featured in the "*M.M.*" from time to time have proved amazingly popular, both with our artist readers and with those who profess to have little skill with pencil and brush. In introducing a variant of the Sketchogram idea, therefore, we feel sure that readers generally will enjoy its possibilities and find it a source of considerable amusement.

The illustration in the centre of the page makes the idea clear. Readers are invited to take the plain circle and triangle and, using them as the main features, produce a simple sketch. The three little sketches accompanying the circle and triangle in our illustration will make this point quite clear. Any number of additional lines and embellishments may be included in the sketch, but it should be understood that the sketch must contain one complete circle and one complete triangle, and one only. A simple sketch in which these two features are immediately obvious will stand a better chance of success than a complicated drawing in which they appear merely as minor features.



Each competitor may submit as many drawings as he wishes, but each must be on a separate sheet of paper, and on the back of each sheet the competitor's name, age and address must be given.

To give our younger readers an equal opportunity of gaining a prize the entries will be divided into two sections, A for readers aged 16 and over, B for those under 16. Prizes of Meccano Products, or Artists' Materials as the winners prefer, to the value of 21/– and 10/6 respectively, will be awarded in each section.

Entries must be addressed "Sketchograms, Meccano Magazine, Binns Road, Liverpool 13," and must arrive at this office not later than 30th November.

A similar set of prizes will be awarded in exactly the same conditions for Overseas entries, which must arrive not later than 29th February, 1936.

Competitors who desire their entries to be returned after the close of the contest must send a stamped addressed envelope of suitable size with the entry. Prizewinning entries are retained by the Editor.

A True Firework Story

The outstanding day in the average schoolboys' diary this month undoubtedly will be "November the Fifth." Few boys will keep entirely free from "scrapes" that day and because we are certain that many of our readers will have funny stories to tell of the day's proceedings we are offering prizes to our readers for "*A True Firework Story*." We do not want readers to treat this as an essay competition, but to spin the yarn as they would recount it to their chums, and address it to the Editor of the "*M.M.*" in the form of a letter.

Prizes of Meccano Products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the senders of the four most interesting letters.

Entries should be addressed to "True Firework Story," Meccano Magazine, Binns Road, Liverpool 13, and should reach the Editor not later than 30th November.

Overseas closing date, 29th February, 1936.

November Drawing Competition

As we announced last month, each month throughout the coming winter we shall feature a straightforward drawing or painting competition, as distinct from humorous sketching competitions, to give readers with artistic ability opportunities to show their skill. No special subjects will be set, and the monthly prizes will be offered simply for the best drawings or paintings submitted during the month.

The entries each month will be divided into the usual two sections, A for readers aged 16 and over, B for those under 16, and prizes of Meccano Products to the value of 21/– and 10/6 will be awarded for the best entries in each section.

A separate set of prizes, to be awarded in similar conditions, will be reserved in special Overseas sections for competitors living outside Great Britain, Northern Ireland, the Irish Free State and the Channel Islands.

(Continued in next column)

COMPETITION RESULTS

HOME

Holiday Story Contest.—1. J. Finch (Hounslow); 2. R. G. Hextall (Nuneaton); 3. F. H. Berry (Bradford); 4. P Baynes (Teignmouth).

OVERSEAS

June Advertisement Competition.—The overseas section now having closed, we append the solution to the June Advertisement Contest: 1. National Benzole Mixture; 2. Hall's Distemper; 3. Bluebird Toffees; 4. Puritan Leather; 5. "His Master's Voice"; 6. Kodak; 7. Player's Cigarettes; 8. Wrigley's Chewing Gum; 9. Wolsey Knitted Goods; 10. Paint Marketing Council; 11. Gibbs Dentrifrice; 12. Skipper Sardines; 13. Buoyant Furniture; 14. O-Cedar Mops and Polish; 15. Lion Packing; 16. Renold Cycle Chains; 17. Force; 18. "Mr. Therm," Gas Development Council. The awards were as follows: 1. D. Maver (Maitland, S.A.); 2. H. C. Key (Calcutta); 3. J. A. Mallia (Malta); 4. R. B. Latimer (Rangoon).

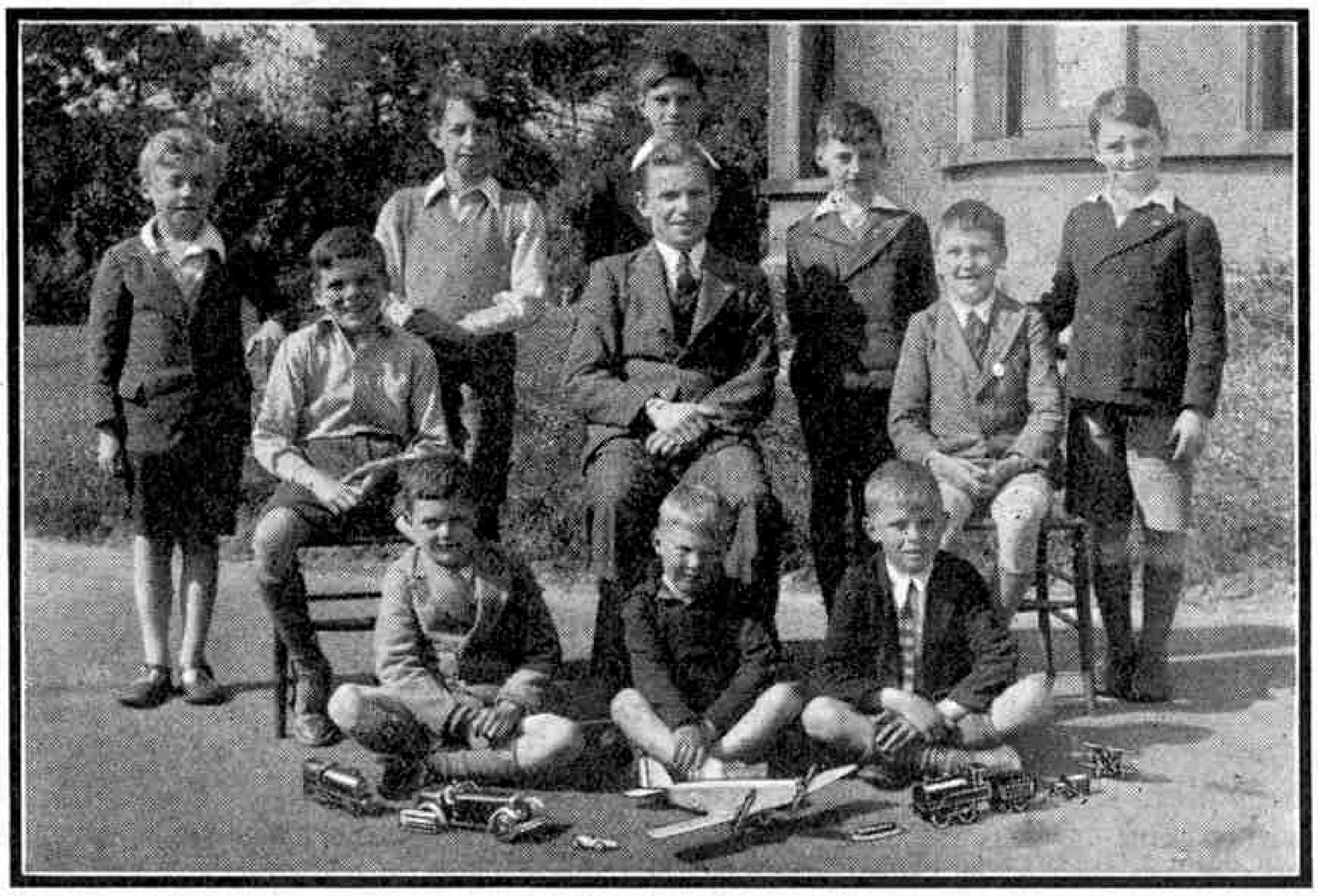
November Drawing Competition (*Cont.*)

Entries to the November competition must be addressed "November Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 30th November. Overseas closing date, 29th February, 1936.

CLUB NOTES

Sutton Valence Council School M.C.—The electrical model built by the club for the Southampton Summer School included an electric fire that glowed realistically when current was switched on, a lamp, a house bell, and other realistic electrical appliances, together with a band saw driven by an electric motor, and miniature traffic lights. The model was highly successful, and Mr. M. C. Morris, H.M. Inspector, was so pleased with the response to his suggestion that it should be made that he presented the club with two accumulators. Merit Medallions and other prizes were presented at a special meeting by Mr. C. R. Boswell, President. Chatham was visited on the Annual Excursion. Club roll: 18. *Secretary:* B. H. Johnes, "The Spinney," Kingswood, Ulcombe, Nr. Maidstone.

Wednesbury and District M.C.—Indoor activities during summer included both Model-building and Table Tennis. Cricket was played regularly and several outings were enjoyed. An imposing model of the Eiffel Tower gave excellent practice in the design and construction of large models. Club roll: 8. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.



Members of the Newtownards M.C., with Mr. W. Harvey, Leader. This club was affiliated in February of this year, and the programme skilfully planned by Mr. Harvey has provided members with varied and enjoyable practice in Model-building. A Hornby Railway section has been formed, and a Rambling Club was organised for the summer months.

Dagenham M.C.—Cycling runs and games in the club room were included in the summer programme, and the Annual Outing to Southend-on-Sea was thoroughly enjoyed by every member. Enthusiasm for model-building continued throughout the outdoor season. The large number of excellent models constructed included representations of the Quebec Bridge, a pile driver, a tractor, a weighing machine and a tramp steamer. One member demonstrated a searchlight driven from a dynamo fitted to a bicycle, his model receiving special commendation from the Leader. Club roll: 19. *Secretary:* J. Dobinson, 17, Freshwater Road, Dagenham.

Hutton Modern School M.C.—Meccano Nights have been devoted chiefly to Competitions, and Hornby Nights to the transport of consignments of goods. Great interest was taken in a special Railway Instruction Night. A cinematograph projector has been placed at the disposal of the club by a keen Meccano and Hornby Train enthusiast, and permission to use the School projector also has been obtained. An interesting Lantern Lecture on "*Famous Cathedral Towns*" has already been given, and arrangements are being made to display interesting films. Club roll: 11. *Secretary:* W. Holdsworth, 44, Victoria Road, Eccleshill, Bradford.

Exeter M.C.—The costing scheme introduced in connection with Contractors' Nights has been elaborated, and a system of "points" covering materials and construction involved has been worked out. The President has initiated what he describes as "A New Deal," with the object of keeping all members of the club busily at work. The central feature of this scheme is the reconstruction on a larger scale of the well-known Workshop Model. The club occupied a stand at the recent Exhibition of the Sid Vale M.C., which was visited by a party of members. Club roll: 22. *Secretary:* T. Smith, 98, Ladysmith Road, Exeter.

Hornsea M.C.—A party of members visited Hull, where they inspected the plant used at Paragon Station for charging the batteries of electric trucks and for supplying current to restaurant cars. An Hydraulic Generating Station was then visited, and the day ended with a Cinematograph Show at the home of Mr. R. W. Shooter, Leader. Intense interest is being taken in model-building and other indoor occupations, including cinematograph shows and games. The financial year's working ended with a good balance in hand. Club roll: 39. *Secretary:* P. Thom, 5, Alexandra Road, Hornsea.

John Gulson Senior Boys' School M.C.—The club's exhibit at the School Open Day attracted considerable attention and the stall on which the models were displayed was surrounded by crowds throughout the Exhibition. The models shown included representations of Sir Malcolm Campbell's "*Blue Bird,*" a Rocket Car, and an Anti-Aircraft Gun, and the Funicular Railway and Meccanograph on loan from Headquarters. Members have built a model of the school Metalwork Shop, in which the lathes, drill, forge and other parts of the equipment are reproduced and driven as in the workshop itself. A Visit has been paid to a local cinematograph theatre, where the operating box and the stage were thoroughly inspected. Several meetings have been devoted to practice in Hornby Train operations. Club roll: 29. *Secretary:* T. Chappell, 8, Troughton Crescent, Radford, Coventry.

Mallow M.C.—A complete overhaul and reorganisation of the club has been carried out under the direction of Mr. W. J Roche, Leader, and members are reported to be "bursting with enthusiasm." The summer months were chiefly devoted to outdoor sports, and on resuming indoor meetings excellent progress was made with the club's model of a local beet factory, which is visited when further information is required. Model-building and Hornby Train operations are both now in full swing. Club roll: 12. *Secretary:* D. Hickey, 42, Ballydaheen, Mallow, Co. Cork.

Millwall Central School M.C.—Members have been busily engaged in the construction of models of past and present locomotives, workshop machinery and household implements. Lantern Lectures have been given by Mr. C. B. Bending, Leader, and an interesting Lecture on "*Czecho-Slovakia*" has been given by Mr. Pace. The subjects of papers read by members have included "*Railway Signalling*" and "*Light Mobile Units on Railways.*" Visits have been paid to the Ford Motor Works at Dagenham and the Royal Mint. The club made a special display for the School Open Day. Club roll: 16. *Secretary:* Mr. C. Shaw, 265, High Street, London, E.14.

Islington M.C.—Model-building and Fretwork were continued during the summer months and steady progress was made. Interesting talks have been given by members on "*How We Spent Our Holidays.*" A varied programme of Model-building and Games is being followed and this also includes Lantern Lectures. Among the subjects of Lectures already given by members are "*How Mickey Mouse Films are Made,*" "*Transport of Foods by the Railway Company*" and "*Old and New Forms of Travelling.*" Club roll: 21. *Secretary:* S. Ryden, 54, Thornhill Road, Islington, London, N.1.

Bristol Grammar School M.C.—This newly-affiliated club has commenced activities in earnest, and many ingenious models have been constructed by the members. Junior and Senior Sections have been formed to enable older members to take part in more advanced Model-building. Hornby Train Nights are popular, and interesting Lantern Lectures also form part of the attractive meetings arranged. Club roll: 40. *Secretary:* N. E. Ricketts, 10, Belgrave Road, Clifton, Bristol.

Well Hall and District M.C.—Several enjoyable excursions have been made by members, including visits to Victoria Station and the South Kensington Science Museum. An interesting visit to the Model Engineers' Exhibition took place. A varied programme has been arranged for the winter months. Club roll: 11. *Secretary:* E. W. Quinton, 48, Beaconsfield Road, Mottingham, Kent.

AUSTRALIA

Melbourne M.C.—The model Gantry Crane designed and constructed by the members of this club continues to provide enjoyable practice in manipulation of loads of all kinds. Contests in which specified loads are to be raised and moved to a given spot are particularly attractive to members. Other types of crane are now being designed and built. Club roll: 12. *Secretary:* L. Ison, 8, Hayes Street, Northcote, N.16, Victoria, Australia.

Sydney M.C.—The appearance of the club's magazine "*The Sydney Meccomag*" aroused great interest, and the first issue was quickly sold out. A larger club room has been secured and the arrangements include a stage and dressing rooms to facilitate the production of tableaux and plays. Model-building continues to be of a high standard, and members have won many prizes in local competitions as well as in those announced in the "*M.M.*" Club roll: 10. *Acting Secretary:* A. R. Wade, 391, Military Road, Mosman, Sydney, N.S.W.

Thebarton Junior School M.C.—Meetings are being held on alternate Mondays, and interest in things mechanical is being maintained by visits to works, and at club meetings at which models of locomotives, ocean liners, buildings and aeroplanes are designed and constructed. A school Honours Board has been constructed by one of the members. Talks have been given on "*Automatic Telephone Exchanges,*" "*Clocks*" and the building of the "*Queen Mary.*" The talk on clocks was illustrated by means of Meccano models, and that on the "*Queen Mary*" was followed by the exhibition of a film showing the launching of the vessel. This year's membership is a record for the club. Club roll: 85. *Secretary:* F. R. Brown, Thebarton Junior Technical School, Ashley Street, Thebarton.

HOLLAND

Maastricht M.C.—An excellent programme is being followed. This includes Model-building Competitions, Cinematograph Evenings and Hornby Train Nights. Special interest is being taken in the construction of model aeroplanes, and the best models are being photographed for entry in "*M.M.*" contests. Club roll: 10. *Secretary:* P. Bosch, Rechstraat 61, Maastricht, Holland.

ITALY

Milan M.C.—A splendid outdoor programme was followed in the later summer months. This included rambles and swimming competitions at the Milan Lido. A Table Tennis Tournament was won by G. De Corrado, Assistant Secretary. Important factories have been visited and interesting experiments have been made by members of the Chemical and Electrical Sections. Club roll: 14. *Secretary:* E. Vigo, Corso Genova 19, Milan, Italy.

Making Meetings Interesting

Meccano clubs have again settled down to their indoor programmes, and from the reports I am receiving from secretaries it is evident that model-building is being pursued with unabated vigour. This is quite natural, as it is the mainstay of most Meccano clubs. One can have too much of a good thing, however, and straightforward model-building needs to be relieved at intervals by something lighter.

Variety is as essential in model-building as in any other club activity, and simple competitions with small prizes are very useful for this purpose. In my notes last month I made a few suggestions for model-building contests, and it should be easy to arrange similar easy but exciting ones. A popular contest at one club is to allow the members taking part to examine for a few moments an assortment of large and small Meccano Parts, or some other objects, grouped together. These are then covered, and the competitors are asked to name the objects just viewed, the winner being the one who is able to name the largest number correctly from memory. It is not as easy as it sounds, and in addition to being an excellent test of memory it introduces the spirit of friendly rivalry that is essential to get the best results.

In arranging model-building competitions care must be taken to work out the details thoroughly in order to place all entrants on a fair basis. There is probably a wide variation in the ages of the members, and in such a case the entrants should be divided into age groups, as is done in the competitions announced in the "*M.M.*" Careful thought to points such as this not only promotes the desired competitive spirit, but encourages those taking part to be original and thorough in their methods.

Meccano Club Secretaries

No. 34. R. C. Symons

R. C. Symons is secretary of the Plymouth Meccano Club. This successful Club was affiliated in October 1926 with a membership of five, and is now one of the largest in the Meccano Guild, with a membership of 70. Model-building is of course the chief activity of the members, and debates and visits to places of engineering interest are also very popular.

Preparing for an Exhibition

The prizewinning entries in many club model-building competitions often have the honour of being given a place in the Christmas or Annual Exhibition. In the big Meccano clubs these Exhibitions have long been a regular and immensely popular feature, but I would like to see many, indeed all, of the smaller Meccano clubs trying their hand at an event of this kind. If they are held back by the thought that the display must be elaborately staged and that unless the models are electrically operated they will lack appeal to visitors, I assure them that their misgivings are quite without foundation. A neatly arranged display of well-built and varied models will attract attention anywhere, and if there is no electric current available it is possible to run many models successfully from an accumulator; and if even this is not possible, smaller working models run by clockwork motors are of interest. The large Exhibitions held each winter by some Meccano clubs began in a small way, when probably the club membership did not exceed half a dozen.

Apart from giving members the pleasure of introducing parents and friends to the scene of their activities, Exhibitions serve two purposes. They are a useful means of raising club funds, as visitors do not grudge the small admittance usually charged, and show great readiness to buy any articles made by members that may be offered for sale on these occasions. They are also a means of gaining new members and of attracting the interest and support of older people who may become good friends of the clubs.

I have many times drawn attention to the value of including in a club Exhibition one or more of the splendid working models that may be obtained on loan from Headquarters. They are not costly to borrow, as the only expense a club has to bear is that of the return carriage on them, and even in the case of the largest models this cost is no more than a few shillings. A list of the models that can be obtained on loan by clubs for display at their Christmas and other Exhibitions is available, and I shall be glad to send copies of this to secretaries. Those who wish to add a model to the attractions of their Exhibition should let me know at least five weeks in advance of the date of the event, as the Meccano Model Department is fully occupied with development and other work. I again draw attention to the need of giving full details of the electric supply available in order that a suitable motor can be fitted.

A New Lantern Lecture

I have received from the Public Relations Department of the General Post Office a copy of a lantern lecture entitled "*A Trip Round the Post Office.*" I am glad to recommend this lecture to Leaders of Meccano clubs, for it gives a most interesting insight into the elaborate organisation by which thousands of letters, parcels and telegrams are dealt with daily, and of the great part played by mechanical equipment in this work.

The lecture is given in Post Office Publication LN.15, a copy of which can be obtained from the Head Postmaster of the district in which the club is situated, and to whom application also should be made for the loan of the necessary slides. As this lecture is likely to be very popular notice should be given as early as possible of the date of the lecture, so as to ensure that the slides will be available in time.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

GLASGOW—Mr. A. A. MacKenzie, 58, Sauchiehall Street, Glasgow, C.2.
LEICESTER—Mr. L. Howard, 3, Sandford Road, Syston.
LONDON—F. Bishop, 151a, The Grove, London, W.6.
LONDON—J. Gavaghan, 113, Fortess Road, Tufnell Park, London, N.W.5.
SWANTON-ABBOTT—E. W. Harmer, Beck's Farm, Skeyton.
MANSFIELD—A. Littlewood, 61, Alcock Avenue, Ravendale.

A Portable Line for Exhibition Purposes

Realistic Results from Scrap Materials

By W. H. Crothall

THE "O" gauge model railway described in this article is interesting as showing the excellent results that can be obtained from materials that normally would be thrown away, with the exercise of a little skill and a good deal of patience. The railway is frequently used with success for exhibition for charitable purposes.

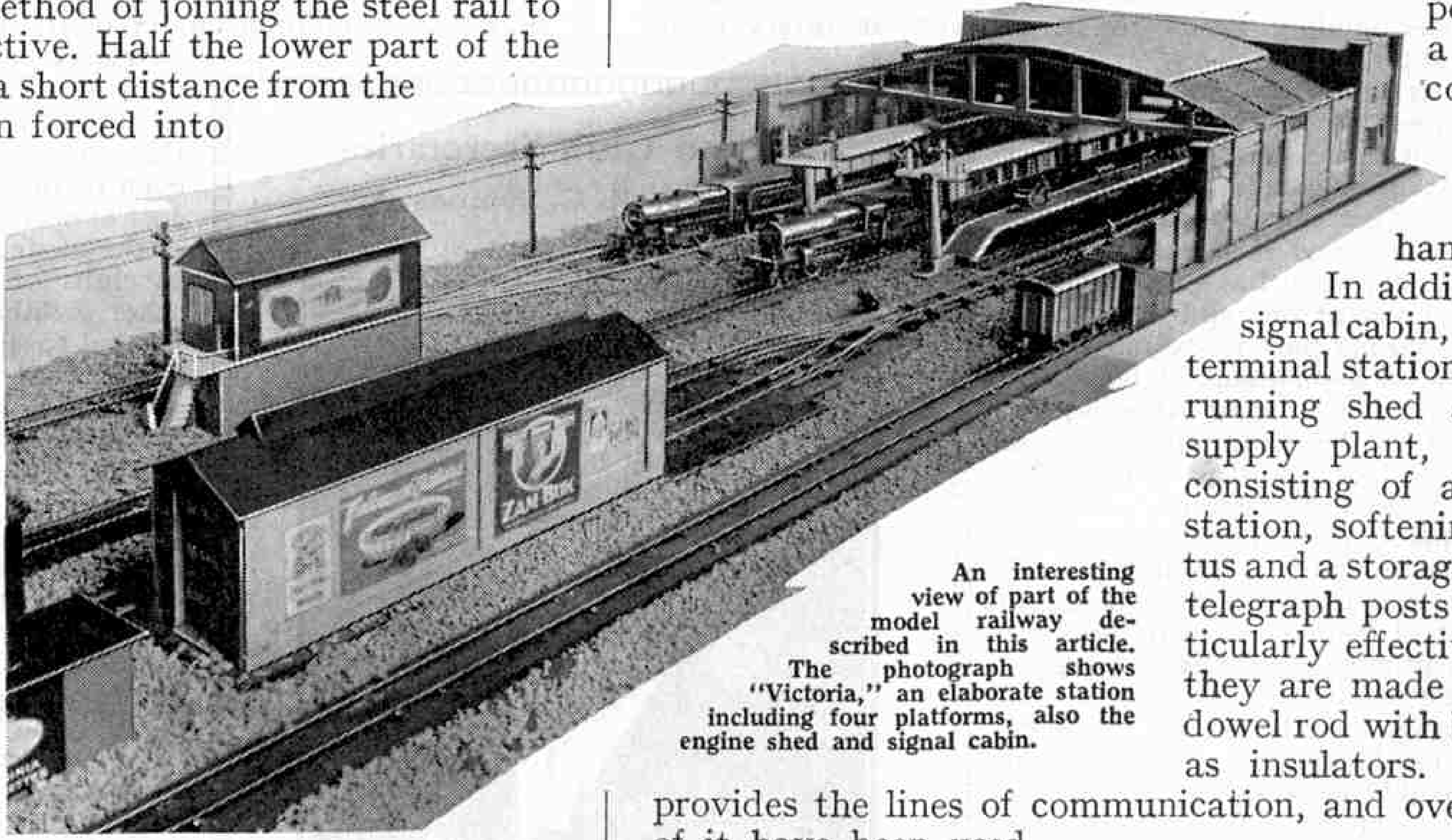
The rails are of mild steel, secured by chairs to strips of wood 6 ft. long, and 3 in. wide. The object of adopting this somewhat unorthodox method is to simplify the transportation of the railway, an important feature in view of its frequent use for display. Hornby Points are incorporated, and the method of joining the steel rail to them is simple and effective. Half the lower part of the steel rail is cut away for a short distance from the end, and the rail is then forced into the hollow head of the Hornby Rail. In assembling the layout for display, after the various sections have been secured to tables by means of small nails, the whole is ballasted by dark grey granite chips, previously washed and screened. The total length of track is 200 ft.

The line commences inside a tunnel, which serves as a marshalling "shed" for the trains. When the railway is working, two operators are stationed at the end of the tunnel, and they control the traffic by means of correct colour-light signalling. Three roads run out of the tunnel, and the colour-light signals controlling them are placed over the arches of the tunnel.

On emerging from the tunnel, the train soon passes over a suspension bridge, which is 3 ft. long. It has three approach arches of cardboard, painted stone colour. An excellent imitation of stone has been obtained by mixing fine sand with the paint, and then applying in the usual manner. The spans of the bridge are painted chocolate brown, wood from an orange box having been used to build these.

After a short run, stopping trains call at a wayside station, named "Belvoir Halt," but the expresses pass this. Most trains stop at the next station "Southfleet," after passing over a lattice girder bridge, for which another orange box supplied the wood. "Southfleet" has three platforms, up and down main, and an island platform. This station was built by a friend after having seen the railway at a local fête and it is a very creditable job. All trains now have an uninterrupted run until eventually they enter the four-platform terminal station, named "Victoria." This station has a large concourse or circulating area, booking offices, and refreshment rooms. Above the concourse are the railway company's offices and the station hotel.

The station presents a very animated scene when the railway is in operation. The Meccano Dinky Toy Station Staff, Passengers, and the Luggage of the Railway Accessories Sets are brought into use and placed in appropriate positions. Throughout the railway over six dozen figures are used. Some of the buildings and components of the railway are made on the "massive" side in comparison, but the railway is a portable one, and the components have to stand up to a lot of handling.



An interesting view of part of the model railway described in this article. The photograph shows "Victoria," an elaborate station including four platforms, also the engine shed and signal cabin.

In addition to the signal cabin, outside the terminal station, there is a running shed and water supply plant, the latter consisting of a pumping station, softening apparatus and a storage tank. The telegraph posts are a particularly effective feature; they are made from $\frac{1}{4}$ in. dowel rod with beads used as insulators. Fine wire provides the lines of communication, and over 500 feet of it have been used.

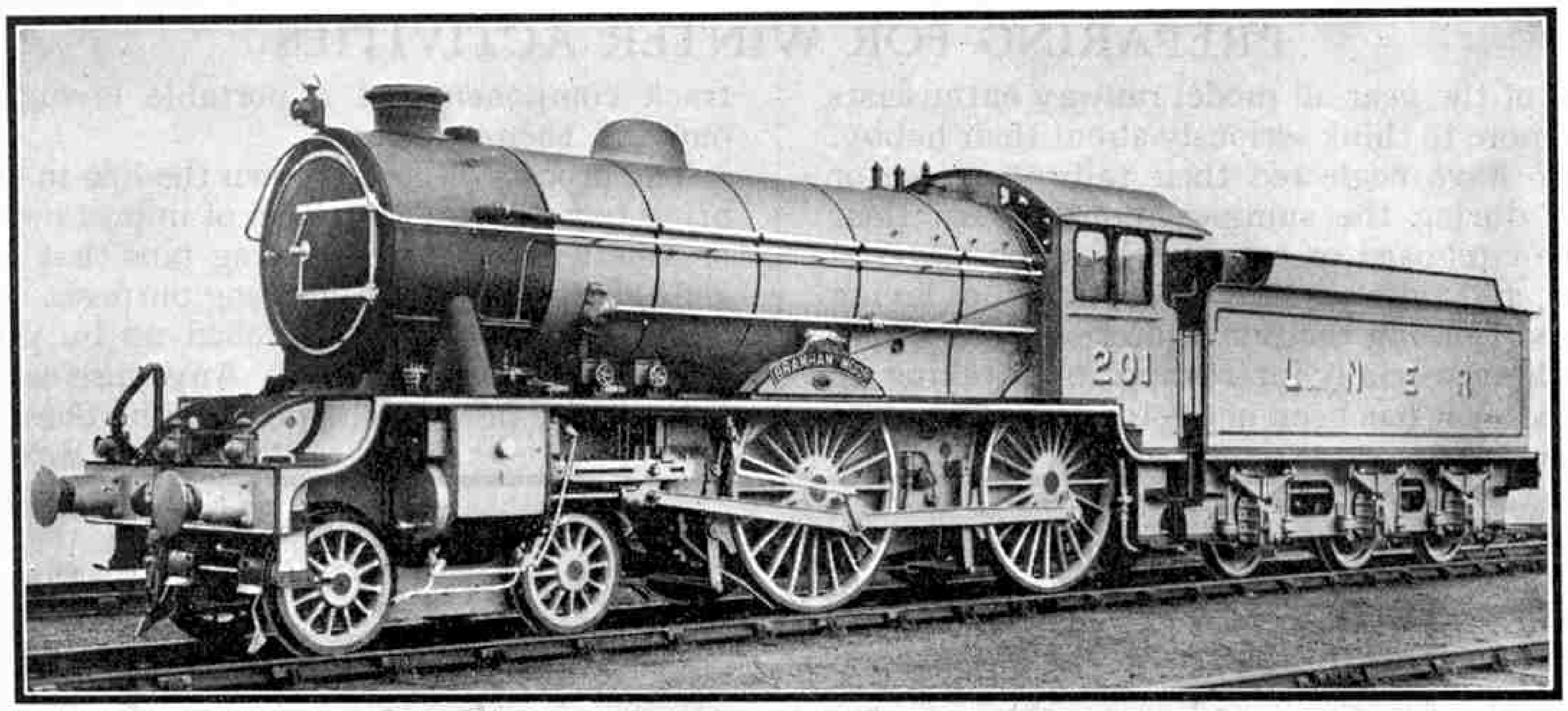
The whole of the rolling stock is home made, and the pride of the line is the Pullman train, which consists of three cars, two first class and a dining car. In addition to this train, there are five corridor coaches, representing the L.N.E.R. "Tourist" trains. In view of the fact that the railway is assumed to be situated in South Eastern districts, this train is regarded as a visitor engaged on through working. The goods rolling stock up to the present comprises eight vehicles including coal trucks, a ballast wagon, banana van, S.R. "general utility" van and a brake van.

Motive power is supplied by eight Hornby Locomotives which work splendidly. They include engines of various kinds, the chief passenger locomotives being of the No. 3C type. One of them is a G.W.R. No. 4073 "*Caerphilly Castle*," its domeless boiler and polished brass safety valve cover lending variety to the stud. Another, possibly in anticipation of the completion of a miniature "Channel Tunnel," is based on a French prototype and is the well-known Hornby Riviera "Blue" Locomotive of the Northern Railway of France. Both of these appear in the view of Victoria Station on this page. A less modern, but still efficient, engine is the old Hornby No. 2 Locomotive. This is used on the less important passenger trains and on goods services.

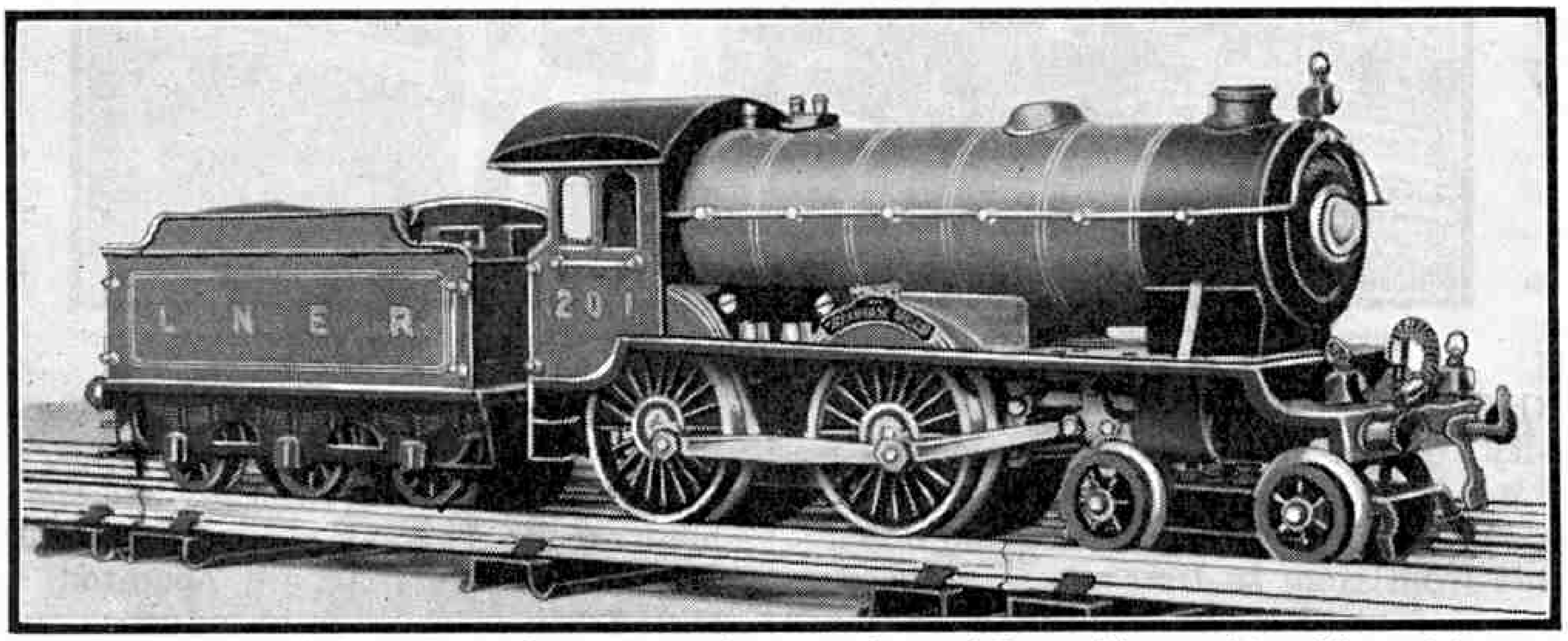
L.N.E.R. "Hunts" in the Hornby Series

By "Tommy Dodd"

IN my last two articles I have dealt with Hornby Rolling Stock, both passenger and goods; this month I propose to turn to locomotives. The Hornby No. E220 Special Locomotives and the corresponding Clockwork types enjoy a splendid reputation among owners of miniature railways for satisfactory performance and realistic appearance. They form a series of true-to-type 4-4-0 locomotives, closely following their prototypes in outline and proportions, and in the details of their finish.


L.N.E.R. No. 201, "The Bramham Moor," the first locomotive of the "Hunt" series, and the prototype of the Hornby Locomotive referred to on this page. All the "Hunts" have nameplates of the special pattern shown in the illustration.

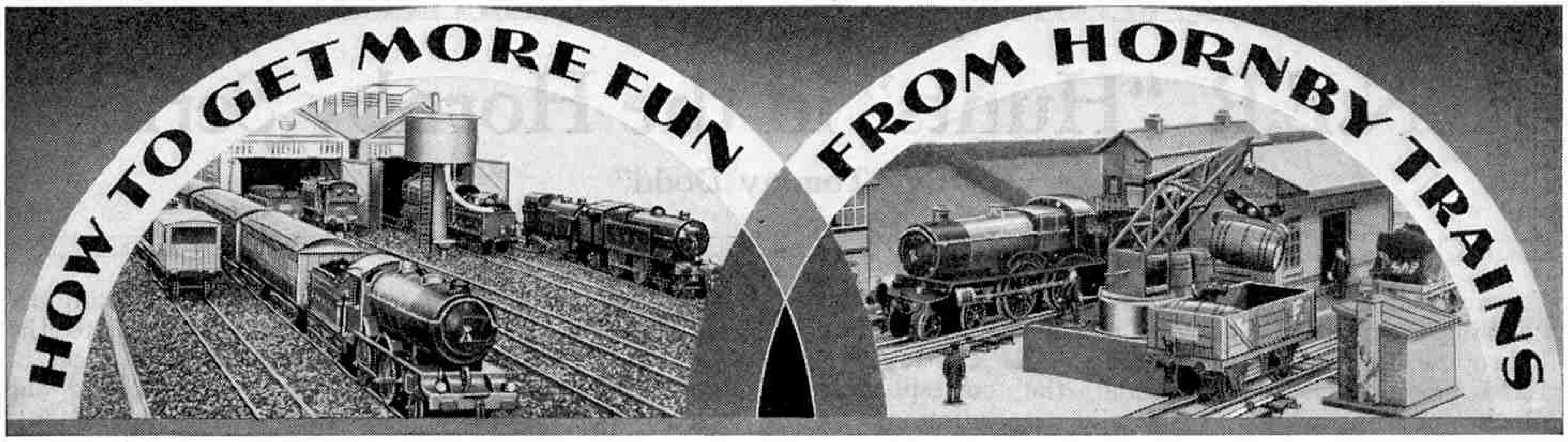
Since the introduction of this series some years ago, the real engines represented have been the L.N.E.R. "Shire" class, L.M.S.R. "Standard Compounds," G.W.R. "County" class and S.R. "L1" class. This year, however, an important and interesting alteration is made with regard to the L.N.E.R. representative, so that the most recent practice of that group with regard to the type is reproduced. The familiar model of No. 234, "*Yorkshire*," is replaced by the more up-to-date one of No. 201, "*The Bramham Moor*." The latter was the first built of the engines forming the "Hunt" series, a development of the "Shire" class of which "*Yorkshire*" was the first.


"The Bramham Moor" of the Hornby Series. The outside steam pipes and the special nameplates of the prototype are accurately reproduced on the model.

In the model no drastic alterations were necessary, a slight modification in detail being all that was required, owing to the general similarity in design of the real engines; yet the effect has been to improve considerably the appearance of the model. Outside steam pipes are now fitted above the cylinders at the sides of the smoke-box, following the typical L.N.E.R. outline and giving the engine a more imposing appearance at the front end.

The characteristic nameplate as fitted in actual practice to the engines of the "Hunt" series is accurately reproduced. It is a separate fitting attached to the splashers of the leading coupled wheels. The effect of the raised brass letters on a black ground and the raised beading round the edge is splendidly carried out, and it is complete with the representation of the running fox that appears above the plate itself on the real thing. This feature shows the association of the names of the engines, each of the class bearing the title of a Hunt that meets in the area served by the L.N.E.R. That chosen for the Hornby model, "*The Bramham Moor*," is the name of the Hunt that centres on the village of Bramham in Yorkshire. The district hunted lies to the North and East of Leeds, and the Hunt has the distinction of having the Earl of Harewood for its Master, thus making this Hornby Locomotive specially interesting.

The development of the real "Shires" and the "Hunts" forms an interesting story. The original design, to which the prototype of the Hornby "*Yorkshire*" conformed, involved the 4-4-0 wheel arrangement with three cylinders, piston valves and Walschaerts valve gear. All the "Shire" engines carry names of counties in which their owning company has interests. Some of the class were fitted with Lentz poppet valves, still retaining Walschaerts valve gear; but the last two constructed were fitted with the full Lentz equipment of valves and gear. When a further batch of these useful and capable locomotives was required, the Lentz poppet valve arrangement was adopted, and the new engines so built form the "Hunt" class. They are employed chiefly in the N.E. area of the L.N.E.R.

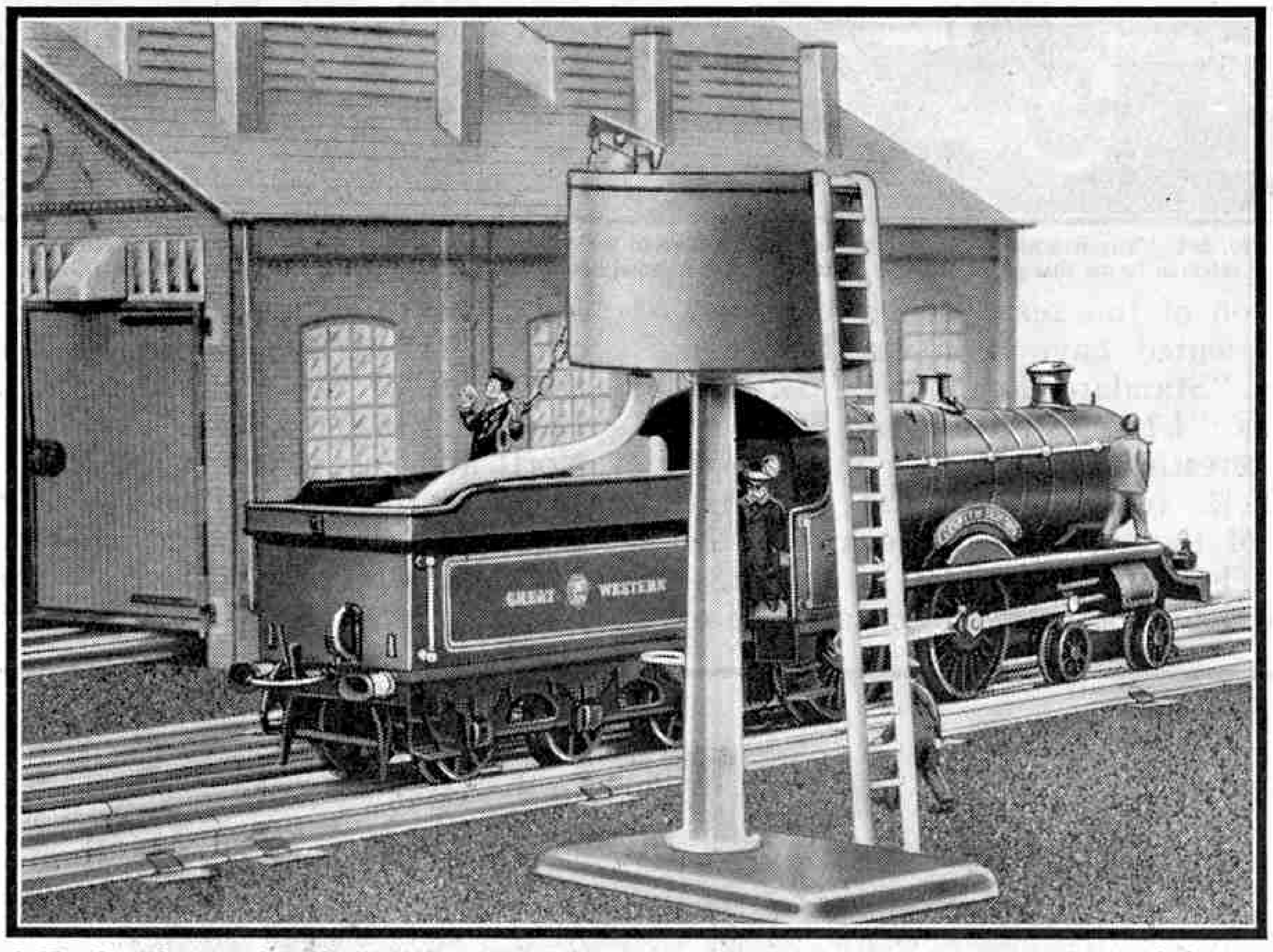


HOW TO GET MORE FUN FROM HORNBY TRAINS

PREPARING FOR WINTER ACTIVITIES

AT this time of the year all model railway enthusiasts begin once more to think seriously about their hobby. Even those who have neglected their railways more or less completely during the summer months turn their attention to the cupboard or box in which the material has been stored, and take an early opportunity of laying out the track and running the first winter services. There is always something specially interesting about taking up a hobby afresh after it has been neglected for a time, and this is particularly the case with the model railway hobby, because there is so much to be done in taking stock of the material and putting it in good working order.

If the various items have been packed away carefully there should be little or no damage to be repaired, but adjustments of various kinds are certain to be necessary, particularly in regard to the locomotives. A thoroughly enjoyable evening may be spent in carrying out the necessary overhaul, and in effecting the small repairs that are needed.



A Hornby "County of Bedford" being prepared for work. Attention to locomotives and rolling stock is part of the regular work of a miniature railway.

The first necessity for the successful operation of a miniature railway is a good track. The rails, therefore, should be carefully examined whether they are laid down permanently or only from time to time when required.

If permanent their inspection is easy, and they are not likely to require any adjustment of level. Truth to gauge is very important, and here the winding key handle, which forms a rail gauge, or the combined Rail Gauge, Screwdriver and Spanner must be pressed into service. By sliding either of them along between the rails of Hornby Track, defective places can be detected immediately. At any tight places that are discovered the rails should be eased apart gently. As it is much easier and quicker to make such an examination of a track that is in position rather than of numerous separate rails, the track components of a portable layout should be set out and then tested.

The process of laying down the line in this manner will bring to notice another item of importance—the presence or otherwise of the projecting pins that are fitted at the ends of the rails for connecting purposes. Where these are loose they should be tightened up by pinching the rail head with a pair of pliers. Any missing pins should be replaced by new ones. These can be obtained at 2½d. per doz. post free, and are far better than the match sticks that are often used for replacements. The hollow rail heads for receiving the pins also should be looked at. With frequent assembly and disassembly of the track they are liable to become too much open as a result of the action of the pins. They should be closed up carefully with a small pair of pliers, a spare pin being inserted in the rail head to prevent distortion while the pliers are being used.

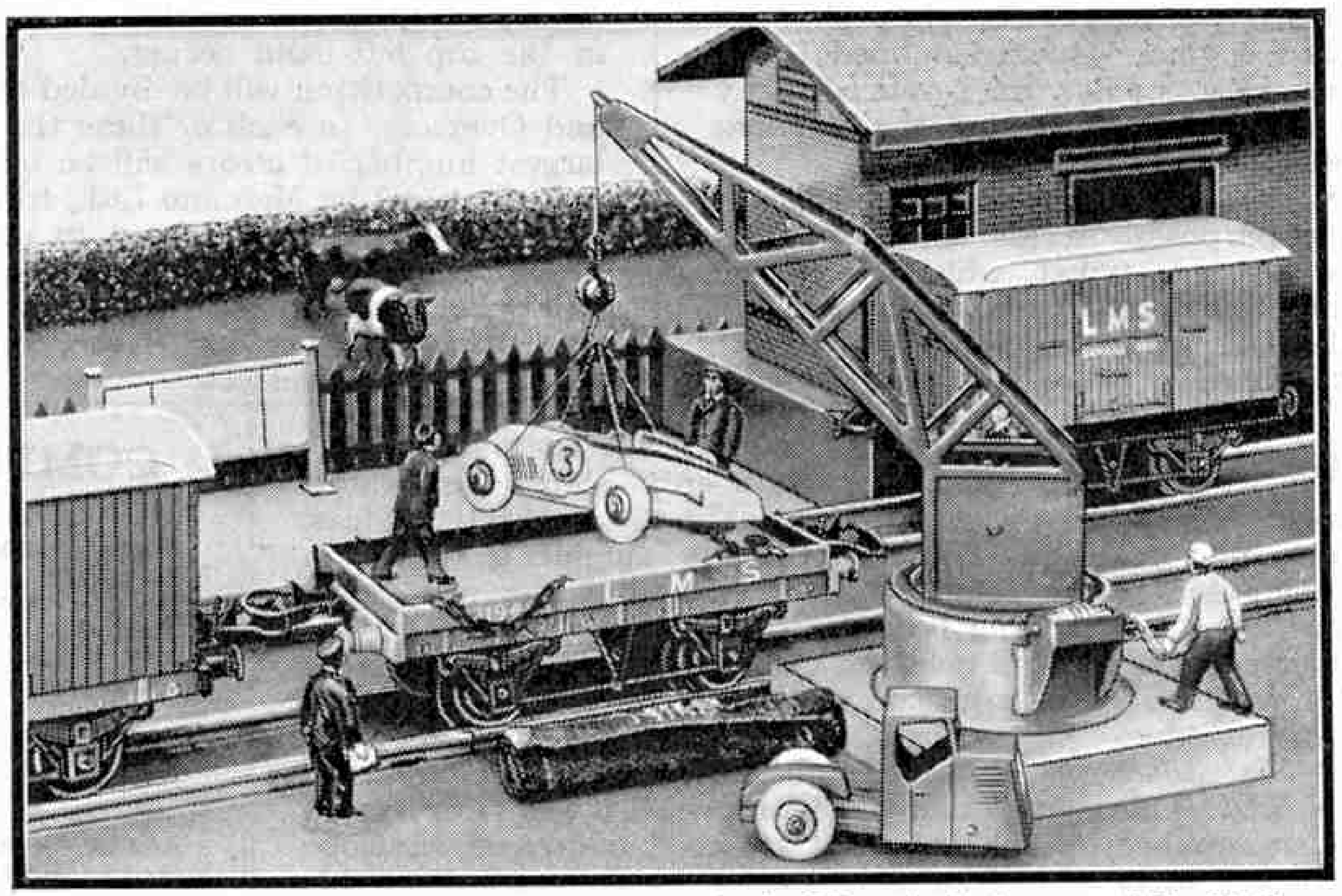
Points may require attention, particularly to their switch rails. The alignment of these in conjunction with the fixed rails when set for either direction should be carefully checked, and any adjustments made. It is not advisable to oil the moving parts of Hornby Points that are operated by hand. A slight stiffness in working is an advantage, in that the points will not then have a tendency to shift under the weight of a passing train.

The rails generally will most likely be dirty, especially if they have not been used for some time. The rail heads may show traces of a sort of black "mud," the presence of which often greatly puzzles the younger miniature railway owners. This deposit is the result of the action of the wheels in rolling over the oil that finds its way on to the rails, together with the dust that settles on them. If this deposit is allowed to remain, as it often is, it is picked up by the wheels, and unless removed periodically it will form a continuous coating round them. This greatly increases train resistance and prevents satisfactory running; and should be removed from the rails, and of course from all wheels, by wiping with a rag that has been soaked with a small quantity of petrol.

The locomotives and rolling stock generally should be carefully examined and if required adjusted and cleaned up. Axle bearings and moving parts may be dirty. Engines and stock that run over carpeted floors have a habit of growing "whiskers" round their axles! Any dirt should be cleaned off, using petrol or paraffin applied with a paint brush of suitable size kept for the purpose. Bogie and pony trucks should be examined and cleaned if necessary, and their adjustment should be checked, or derailments may be experienced when the engine is returned to service.

A typical section of a Hornby Railway. Level and well-laid track is essential for smooth and satisfactory running.

Clockwork mechanisms will probably need cleaning in the same way. When a mechanism has been washed out and is seen to be quite dry Meccano Oil should be applied sparingly to all spindles, gears and bearings. For the lubrication of the spring, Meccano Graphite Grease is ideal, and should be introduced between the coils. It may be necessary to give the mechanism a few turns of the key in order to cause the individual coils of the spring to separate slightly. The grease may be applied direct from the nozzle of the tube or, for those parts of the spring that are more difficult to reach, by means of a small paint brush.



Unloading a Racing Car, to be towed away by the Mechanical Horse in the foreground. The Platform Crane is a good example of a working accessory.

Graphite Grease is an excellent lubricant also for those vehicles fitted with axle-boxes, such as the No. 2 Special Tenders and Pullman Coaches, and the new No. 2 Coaches. To pack the axle-boxes with grease the wheels should be removed and the nozzle of the tube containing the grease applied to the axle hole in the frame. Great care should be taken not to apply too much, and any surplus should be wiped off. Before the wheels are replaced the axle journals—the ends that run in the axle boxes—should be freed of any dirt and old oil.

Tinplate wheels should also be removed and cleaned with a petrol rag, and it is good practice to wipe over the bearing holes in the axle guard or trunnion at the same time. Before replacing the wheels a drop of Meccano Oil should be applied to the axles; it is important not to apply too much, as any excess will quickly find its way to the track and start slipping troubles.

Electric locomotives naturally require their share of attention. Axles, gears, coupling rods and wheels should be cleaned of any dirt that may have collected on them, and particular attention should be paid to the wheel treads and collector shoes. After cleaning up, the engine should be tested and any slight defects treated according to the instructions packed with each locomotive.

The connections to the line from the power supply should be checked over and any loose contacts should be made good. Plug connections that have become loose in their sockets may be tightened up after being withdrawn from the sockets by placing a penknife or thin screwdriver blade in the longitudinal slot in the plug in order to separate slightly the two sections of the fittings. Any connections made by means of terminals should be examined and tightened up if necessary. Terminal connecting plates may require their fuses renewed. If so great care should be taken to use the appropriate wire according to the instructions packed with the Locomotive and the Transformer.

With the track and the stock now in order, the next step is to examine the various accessories. Some of these, such as buildings, will not require much more attention than dusting. This can be done best by means of a soft brush kept for the purpose. If the accessories have become dull and shabby-looking, a brisk rub with an oily rag after dusting will work wonders. On the other hand accessories such as Level Crossings or Signals that incorporate moving parts will require more close inspection and attention. Any old oil on them should be cleaned off and fresh applied. Any adjustments required such as to the weight levers and operating rods of the signals should be carried out at the same time.

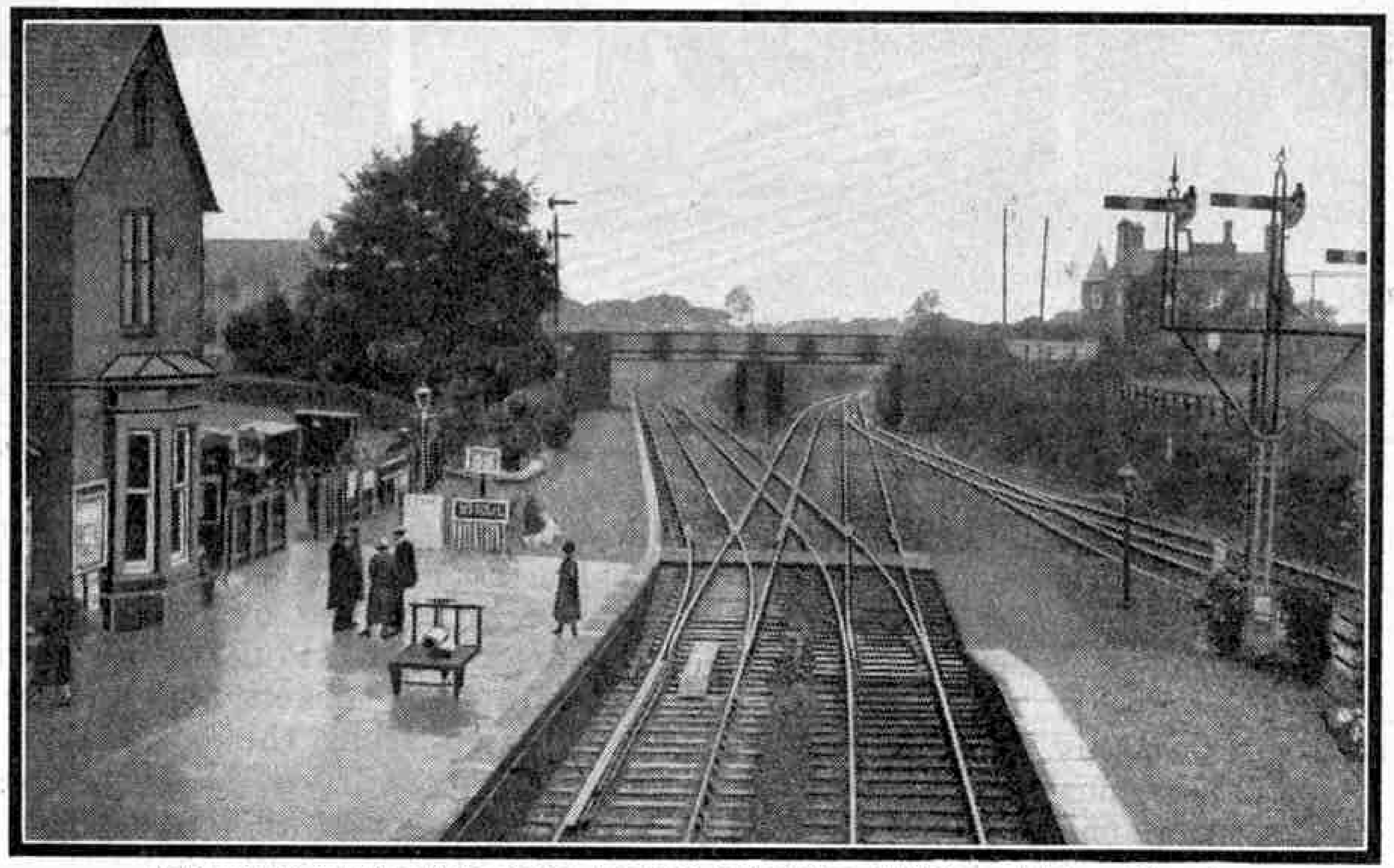
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

ERRORS CONTEST

Some time ago a young and enthusiastic member of the Hornby Railway Company went to stay for a short holiday with his Uncle, who lived near to an important railway junction. Our member was not slow to seize the first opportunity of visiting the station, and he spent an exciting afternoon studying railway operations.



"Horncastle Junction," the station described in the "dream" letter printed on this page.

He was so pleased with everything he saw that he decided to write home next day and tell his brother all about it. During the night he dreamed that the letter had already been written, and that it read as follows.

"Dear Bill, I spent the whole of yesterday afternoon at Horncastle Junction, a fine place for seeing trains. It is on the L.M.S.R. main line from Derby to the West. Most trains stop there, and those that do not have to slow down considerably for the exchange of tablets, which is carried out automatically by means of special apparatus. The principal trains are of course the "Mails," which are articulated throughout and composed exclusively of caravan coaches. They are always hauled by "Castle" class engines. The streamlined Diesel rail cars run this way, and seem very popular, for I noticed many people taking tickets at the bookstall and paying the Pullman supplement for these services.

Goods traffic is fairly heavy, and passengers make good use of the warehouse for left-luggage purposes. Access to the yard is only possible by means of a platform ticket, which has to be given up to the policeman in the gateway, or to one of the travelling ticket examiners who assist the policeman in these duties.

There is an engine shed with a variety of locomotives belonging to it, and the L.N.E.R. branch engine is sometimes to be seen under repair here. However, I hope to visit the shed in a day or two and will write and tell you all about it."

Readers who have got so far will have noticed that this "dream" letter is full of mistakes, probably as a result of too much pie for supper! At any rate it provides an excellent opportunity for H.R.C. members to demonstrate their general railway knowledge and sharpness of eye; and for our competition this month we ask them to point out as many errors as they can find in the letter. The mistakes are numerous, and some of them are liable to pass unnoticed; so that competitors will be well advised to read through it very carefully. When each entrant is sure he has tracked down every mistake, he should make out a neat copy of his list and forward it to Headquarters at Meccano Ltd., Binns Road, Liverpool 13, in an envelope marked *"H.R.C. November Errors"* in the top left-hand corner.

The competition will be divided as usual into two sections, Home and Overseas. In each of these the sender whose list contains the largest number of errors will be offered a choice of any products manufactured by Meccano Ltd., to the value of 21/–. To the three entries that are judged next in order of merit will be awarded similar prizes to the value of 15/–, 10/6 and 5/– respectively. A number of consolation prizes also will be awarded. The closing dates are 30th November for Home competitors, and 29th February 1936 for those Overseas.

Drawing Contest

Railway Drawing Contests are always popular with H.R.C. members, and invariably produce a crop of well-executed entries. This month, therefore, we announce a Drawing Contest in which competitors are invited to show their skill in representing a most important up-to-date introduction on British railways, *"The Silver Jubilee"* express of the L.N.E.R. This remarkable train, and the streamlined "Pacific" locomotive No. 2509 *"Silver Link,"* exhibit striking changes in external outline from the usual type of train, and together or separately form a fascinating subject for pencil or brush. Competitors can either draw the engine and tender or the complete train. This will give those boys who aim at general effect an equal chance with those who specialise in locomotive details.

To the four competitors in each section, Home and Overseas, who submit the best drawings, prizes consisting of any products manufactured by Meccano Ltd., to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded. In the case of a tie preference will be given to the competitor whose entry shows the greatest number of original and yet practical ideas.

Competitors may submit drawings in colour if they wish, but the prizes will not necessarily be awarded to the senders of coloured drawings. On the back of each entry must be clearly written the competitor's name, age, full address and H.R.C. membership number. Unsuccessful entries will be returned if they are accompanied by a stamped addressed envelope of suitable size. Prizewinning entries become the property of Meccano Ltd.

Envelopes containing entries should be marked *"H.R.C. November Drawing Contest"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 30th November. Overseas closing date 29th February, 1936.

Competitors should make every endeavour to see that their entries reach Headquarters on the published closing dates. Any entries received after these dates will not be entertained as judging takes place immediately after the last post on the dates mentioned.

COMPETITION RESULTS

HOME

August "Photo Voting Contest."—First: C. Brett (5868), Great Coates, Lincs. Second: A. Beamish (39403), Hammersmith, London, W.6. Third and Fourth (Tie): E. R. Dudley (37680), Carshalton, Surrey, and C. E. Wrayford (6039), Moretonhampstead, Devon. Consolation Prizes: C. G. Gibson (24036), Emyvale, Co. Monaghan, Ireland; B. Ashworth (43326), Thirsk; C. T. Leeson (40340), West Hampstead, London, N.W.6; J. L. Makin (30933), Penwortham, Preston; J. Owen (42289), Denby Dale, Huddersfield; J. C. Button (10335), Crewe.

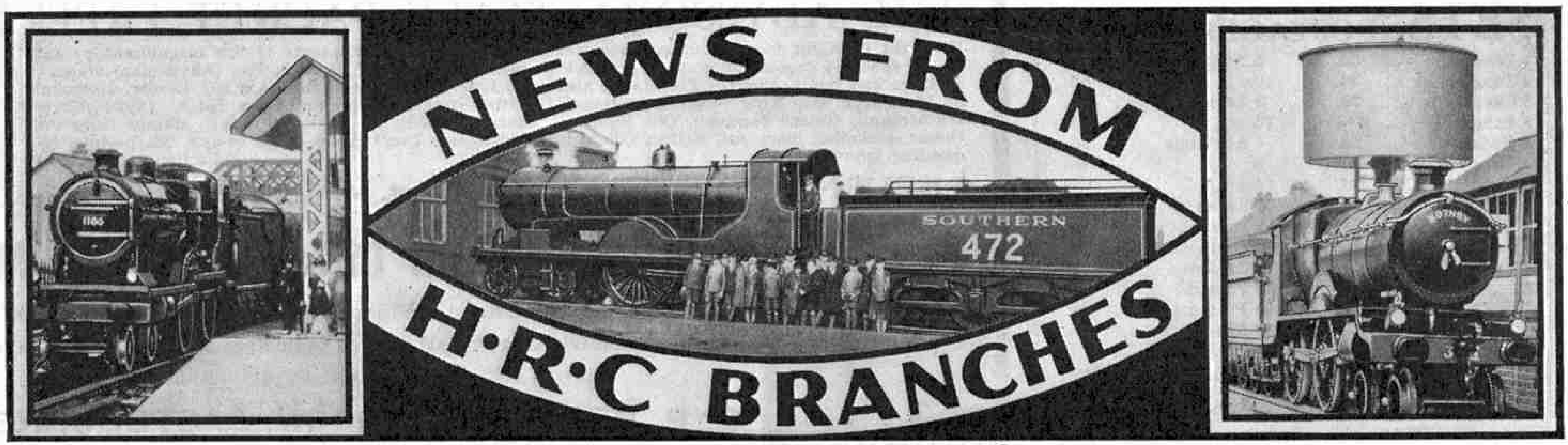
August "Railway Photo Contest."—First: E. C. Morgan (10735), Wandsworth Common, London, S.W.18. Second: J. T. Wilson (42874), Edinburgh, 10. Third: D. F. Forbes (14092), Leith, Edinburgh, 6. Fourth: J. W. Hague (1258), Ripon, Yorks. Consolation Prizes: P. Andrew (22670), New Barnet, Herts.; F. Hodson (9430), Bolton; J. A. Phillips (10849), Handsworth, Birmingham; J. F. Ennos (12956), Addiscombe, Surrey; G. Aspinall (33643), Primrose Hill, Huddersfield.

OVERSEAS

May "Railway Photo Contest."—First: R. Perry, Parkwood, Johannesburg, S. Africa. Second: J. A. Coates (23863), St. Lambert, Quebec, Canada. Third: P. Galdes (14183), Valletta, Malta. Fourth: G. E. Schulz (15425), Coromby, Victoria, Australia. Consolation Prize: F. D. Aria (12362), Bombay, India.

June "Jumbled Names Contest."—First: I. Brough (9112), Victoria, Australia. Second: J. A. Rodriguez (3647), Montreal, Canada. Third: D. J. White (9333), Christchurch, New Zealand. Fourth: R. A. Wragg (7913), Bandikui, India.

NEWS FROM H·R·C BRANCHES



Branch News

Dagenham.—Keen discussions have taken place on the arrangements for track working and other activities. Additional interest was created at one meeting by the introduction of an electric layout. Games have been played, and the Annual Excursion to Southend was thoroughly enjoyed. Enthusiasm is increasing and better attendances are being obtained. Secretary: P. Bush, 121, Church Elm Lane, Dagenham.

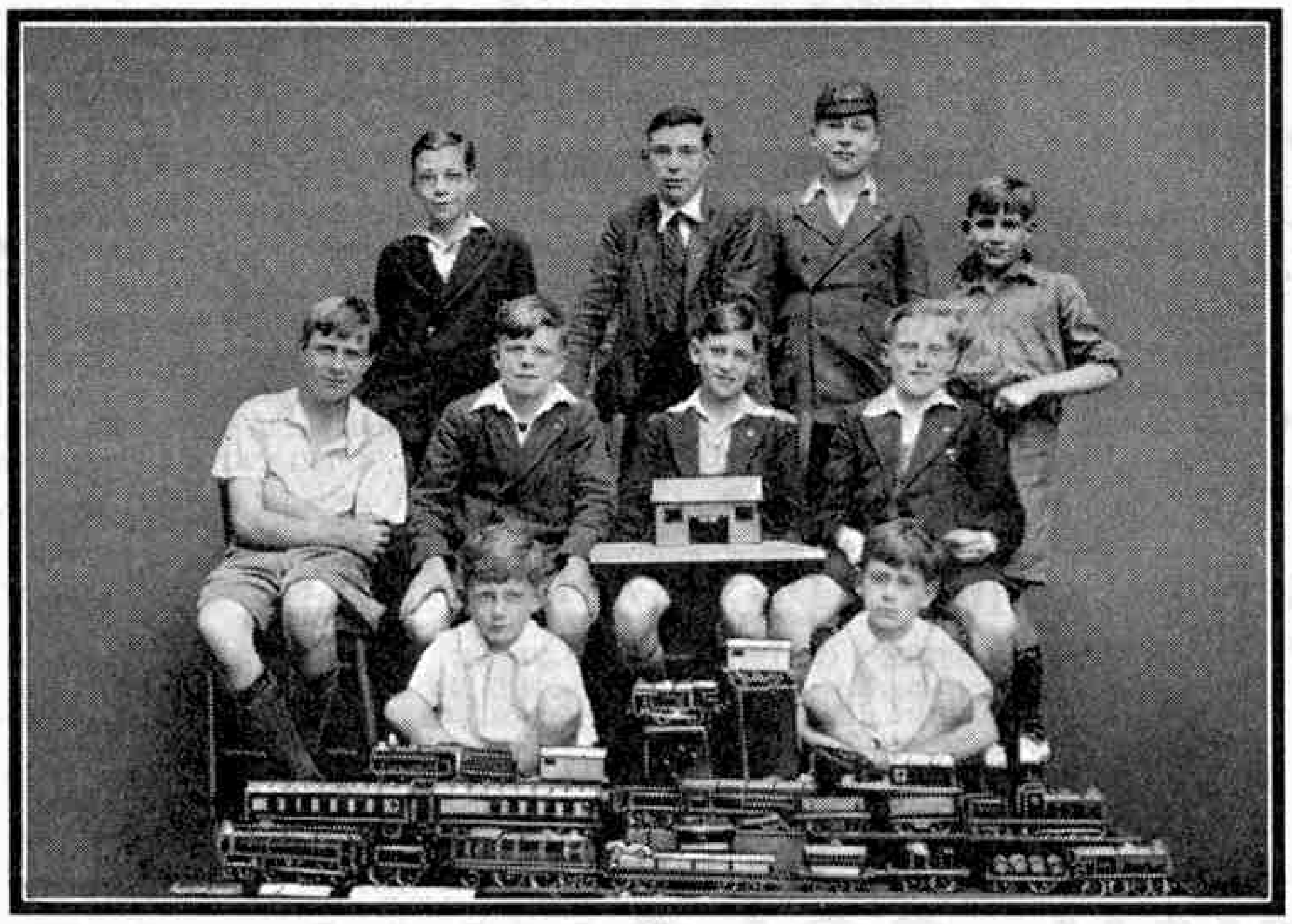
Bowerham (Lancaster).—Regular meetings are held on Saturday mornings, but the Branch room is open one night during the week for the benefit of those unable to attend on Saturdays. Timetable working and shunting operations are being practised steadily. Lectures have been given by the secretary on *"Gradients,"* and by a member on *"The Stoker's Job."* During a visit to the local engine sheds, the working of a "Midland Compound" and other locomotives was demonstrated and members enjoyed a trip on a tank locomotive. A Branch library has been formed. Secretary: G. Fairweather, 44, Palatine Avenue, Bowerham, Lancaster.

Preparatory School (Sedbergh).—Railway operations have continued in spite of outdoor attractions, and a demonstration arranged for parents of members was greatly appreciated. Drawings made by members have been placed on the wall of the Branch room and help to give the layout a realistic appearance. Secretary: D. B. L. Smith, Preparatory School, Sedbergh.

Cottesmore.—The Branch has been limited to 30 members, who meet on Wednesday evenings. Special events have included a meeting to welcome new members and Visitors' Night. Special layouts are given trials extending over a month, and provide facilities for about six trains. This plan ensures variety and gives members wide experience in various branches of miniature railway operation. Secretary: D. Woodburn, Cottesmore Central School, Lenton, Nottingham.

Woodford.—During the summer outdoor activities have predominated, and these have included clock golf matches between sections, and also between individual members. Track meetings have now been resumed and excellent progress is being made. Secretary: J. H. Skelt, 27, Woodside Road, Woodford Wells, Essex.

New Southgate.—Track meetings for timetable operation have been varied by experimental runs with members' locomotives to provide a basis for future working. A Social Evening was made enjoyable by impromptu speeches and Competitions, including "Question and Answer" Contests on railway subjects. A visit has been paid to the Sorting Office at Mount Pleasant. An Exhibition is to be held in January and members are fully occupied with the necessary preparations. Secretary: A. R. Wardle, 25, Limes Avenue, London, N.11.



A group of members of the Islington Branch, No. 290. Chairman, Mr. V. Miller; secretary, E. Muxlow, who in our photograph is on the left of the back row. The Branch was incorporated in June 1935. It works in association with the Islington M.C., and members are keen on trying various layouts in order to make the best use of their extensive collection of rolling stock.

Addiscombe.—A Branch room has not yet been secured, but enjoyable meetings are being held at the home of each member in turn. Layouts are temporary, but this gives opportunity for varied practice, and meetings are very enjoyable. A very successful Concert was given by members. In an interesting contest arranged for one meeting, members were asked to draw the H.R.C. Badge from memory, and as with similar contests this proved a severe test of the accuracy of members' observation! Secretary: G. Chandler, 62, Ashburton Avenue, Addiscombe, Croydon.

Priory (High Wycombe).—There was a record attendance at the annual prize-giving meeting. Many track meetings have been held, and great interest is taken in timetable working. A new station and numerous scenic effects have been added to the layout. Other important additions include a subway at the main station and a road bridge, and consideration is being given to the construction of an overhead branch line. Secretary: J. T. Cosgrove, 54, Priory Road, High Wycombe, Bucks.

St. Thomas (Exeter).—A new and improved layout is being laid down and material purchased to enable it to include a four-track main line. Further details will be given in a later report. Additional rolling stock is to be obtained so that increased track activities will be possible this winter. At present members meet twice weekly, but a Branch room is needed so that meetings can be held more frequently. Secretary: L. Robinson, 9, Union Street, St. Thomas, Exeter.

Sheffield (First).—At Sheffield L.M.S. Station recently a friendly engine driver allowed several members to mount the footplate of his engine, and at Chesterfield Central Station one member was allowed to try to drive a tank engine! Track working has been the chief feature of meetings, and fast expresses, including three named trains, are run regularly. Secretary: W. B. Hutchinson, 35, Linden Avenue, Sheffield, 8.

AUSTRALIA

Melbourne.—The reorganised Branch meets in a shed kindly placed at its disposal by one of the members. Work is proceeding on the construction of a layout that combines indoor and outdoor track, and rolling stock and locomotives are being overhauled in readiness for the entensive operations planned. Table Tennis, Billiards and other games provide variety at special meetings. Visits have been paid to the North Melbourne Locomotive Depot, Newport Work Shops and to the Melbourne Meccano Club. Secretary: L. Fletcher, 66, Davies Street, N.10, Melbourne, Victoria, Australia.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below. All owners of Hornby Trains or accessories are eligible for membership and the various secretaries will be pleased to extend a warm welcome to all who apply.

Liverpool—W. Kenyon, 92, Mill Street, Liverpool 8.

Morden—A. M. Evans, 31, Arras Avenue, Morden.

Stanmore—P. Barron, Iford, The Ridgeway, Stanmore.

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With the limelight focussed upon these two great countries, the contents of this magnificent packet are of specially topical interest. It includes a splendid short SET of Ethiopian (Abyssinian) stamps, all large and multi-coloured. The Italian stamps include fine Statue of the FASCIST Leader, Mussolini on Horseback, also King Victor Emmanuel III. Other countries represented are Set 3. Japan (Chrysanthemum), Guiana (unused), Old Russia (Romanoff period), Upper Volta (mint), stamps from the Orient, including Siam and British Colonials, 55 different. Don't delay—send to-day, 2d. postage requesting approvals. (Collections purchased.)

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FREE! 7 Silver Jubilees. FREE!!

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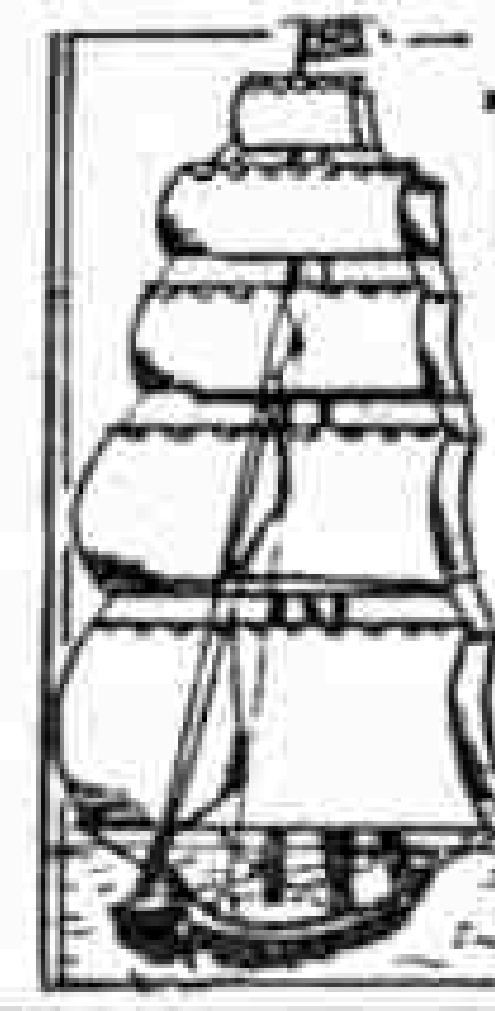
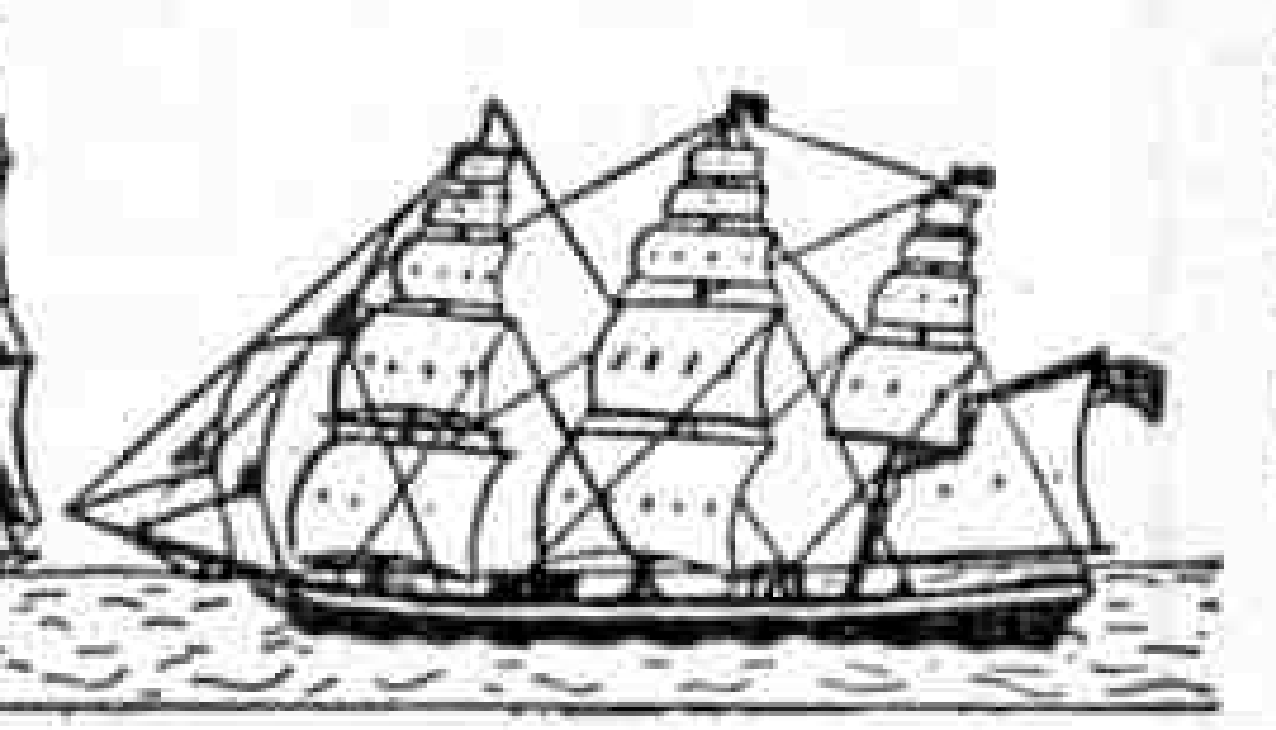
HELY. HUTCHINSON (M3), Hurrock Wood, Kents Bank, Grange-over-Sands.



THE 'SHIP' PACKET



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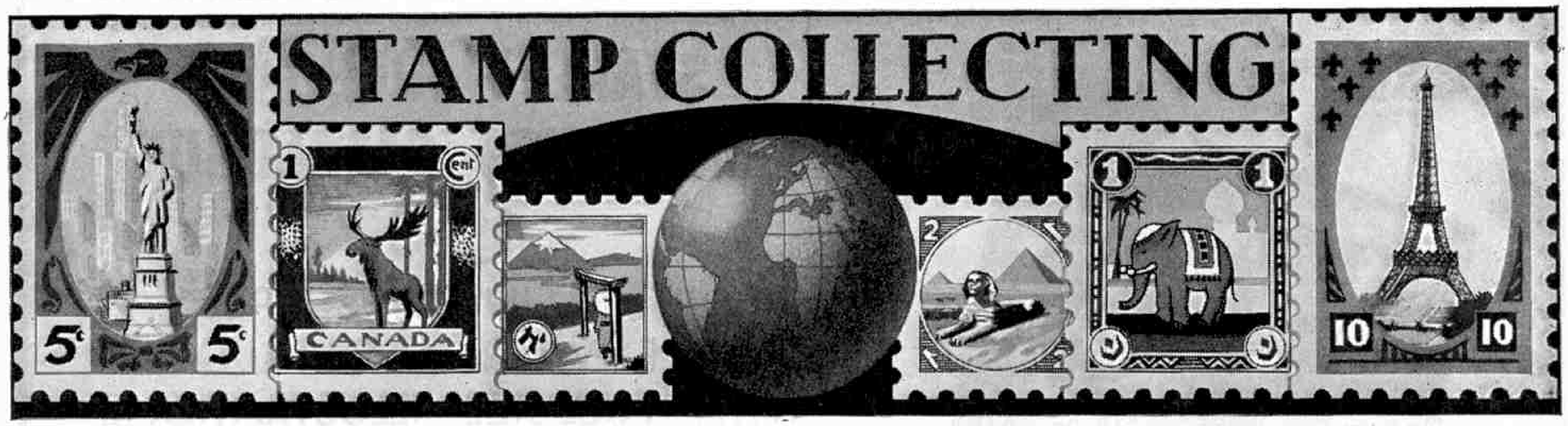
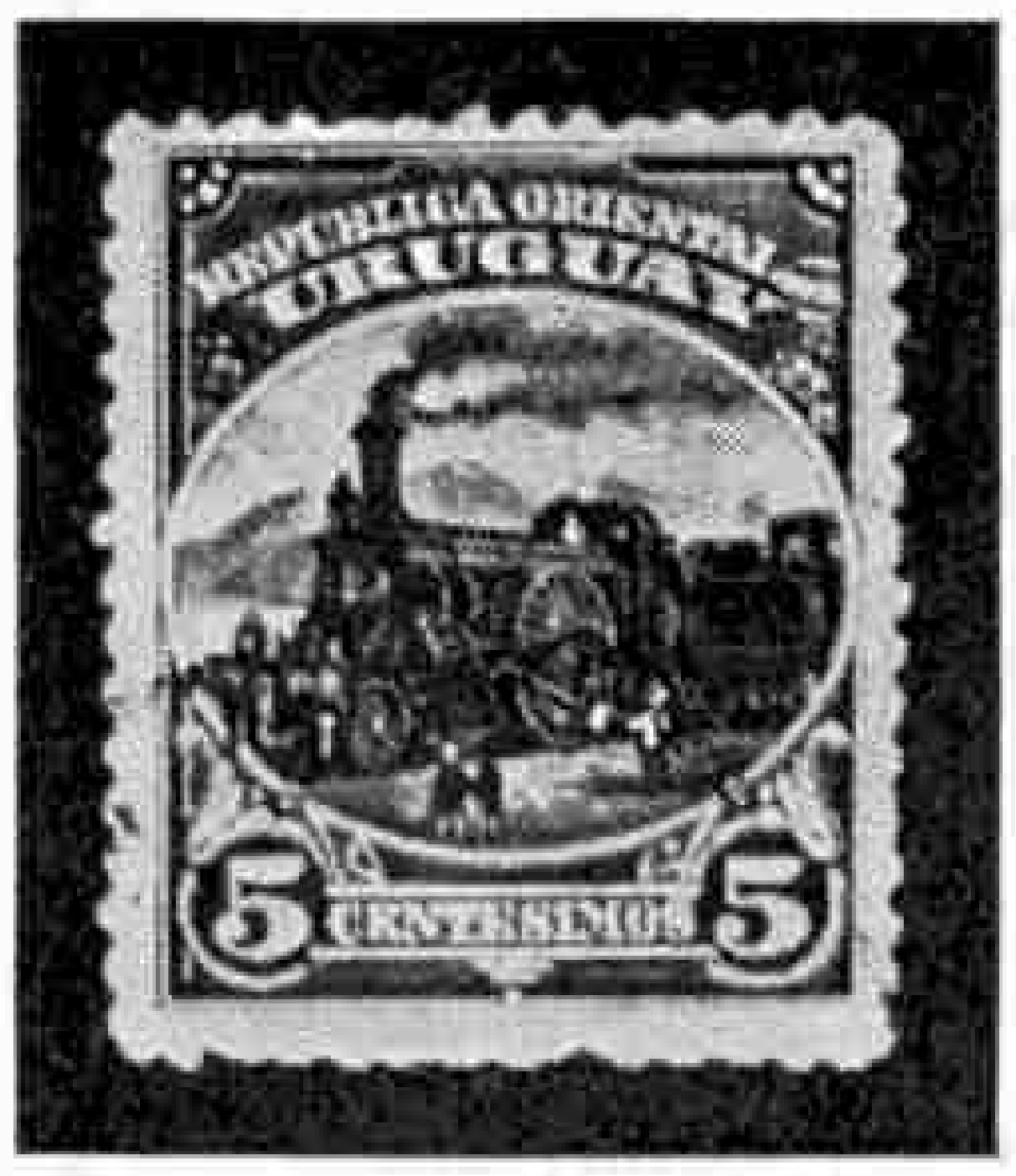
For further stamp advertisements please see pages 680, 682 and xxviii



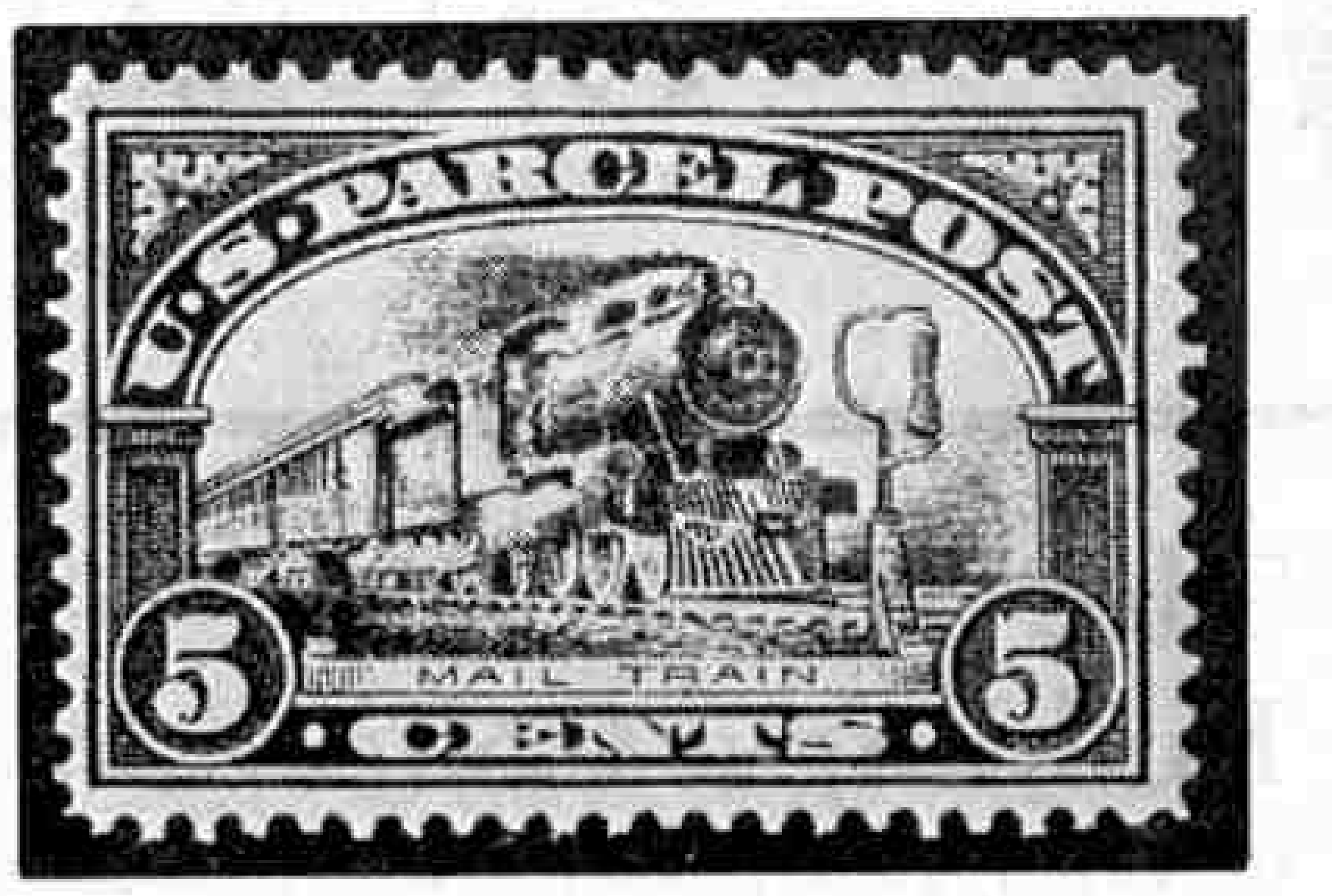
A RAILWAY MUSEUM IN STAMPS



THE famous Railway Museum at York attracts railway enthusiasts from all over the country, and indeed from all over the world. Unfortunately only a comparatively small proportion of our readers are so situated that they can visit this museum, and in this article we suggest the less exciting but still extremely interesting alternative of collecting and arranging a railway museum in stamps. Pictorial stamp designs are rich in railway subjects, and the whole story of locotive development, from "woodburners" to "streamlined Diesels," can be well displayed.

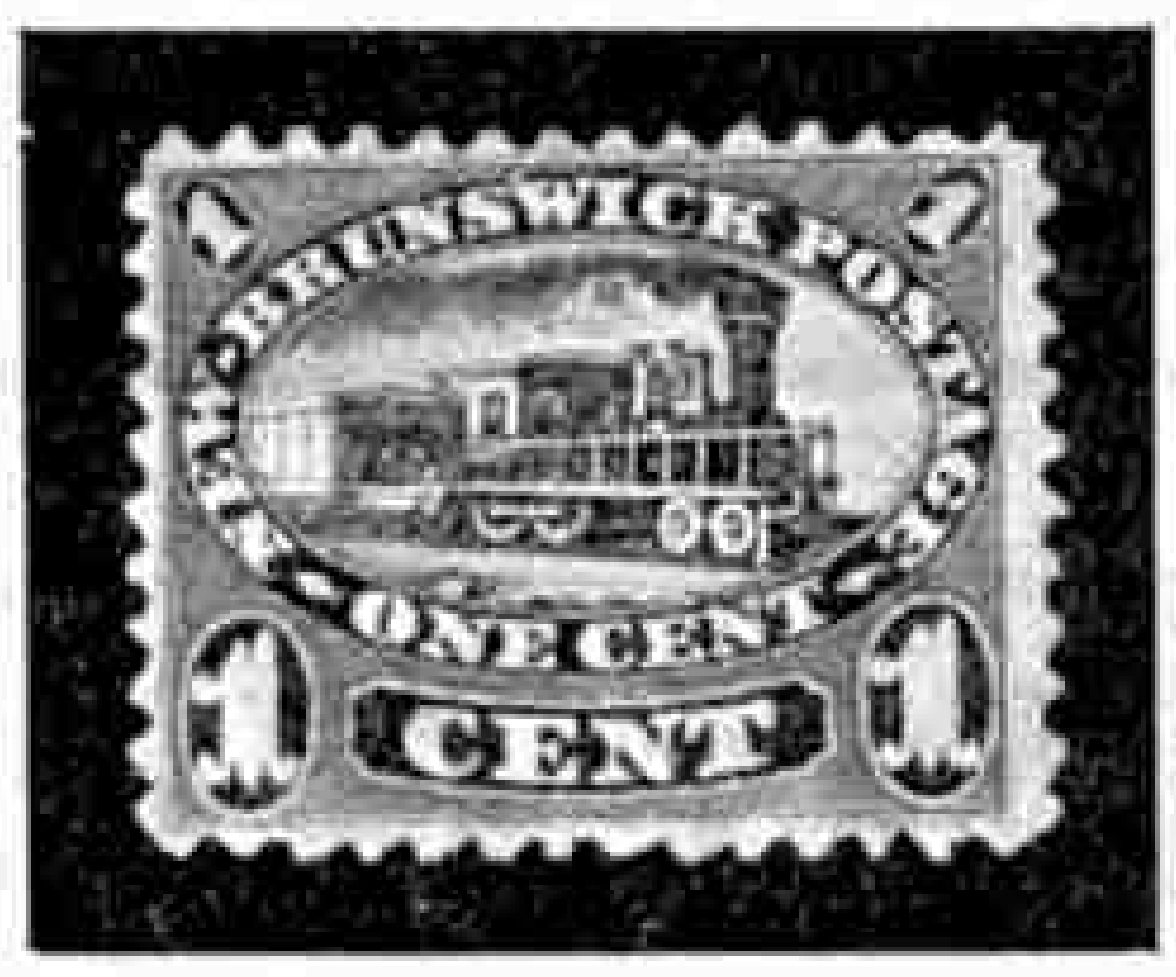
The earliest railway stamp was the 1c. issued on 15th May 1860 by New Brunswick, one of the eastern provinces of Canada. This, as will be seen in our illustration, showed a 4-4-0 locomotive, a woodburner, fitted with a huge spark arrester to eliminate the chance of stray sparks causing forest fires.

An outstanding feature of the engine is the high railing fitted around the footplate gangway, presumably to allow the driver to take a stroll around his locomotive without the fear of falling off!

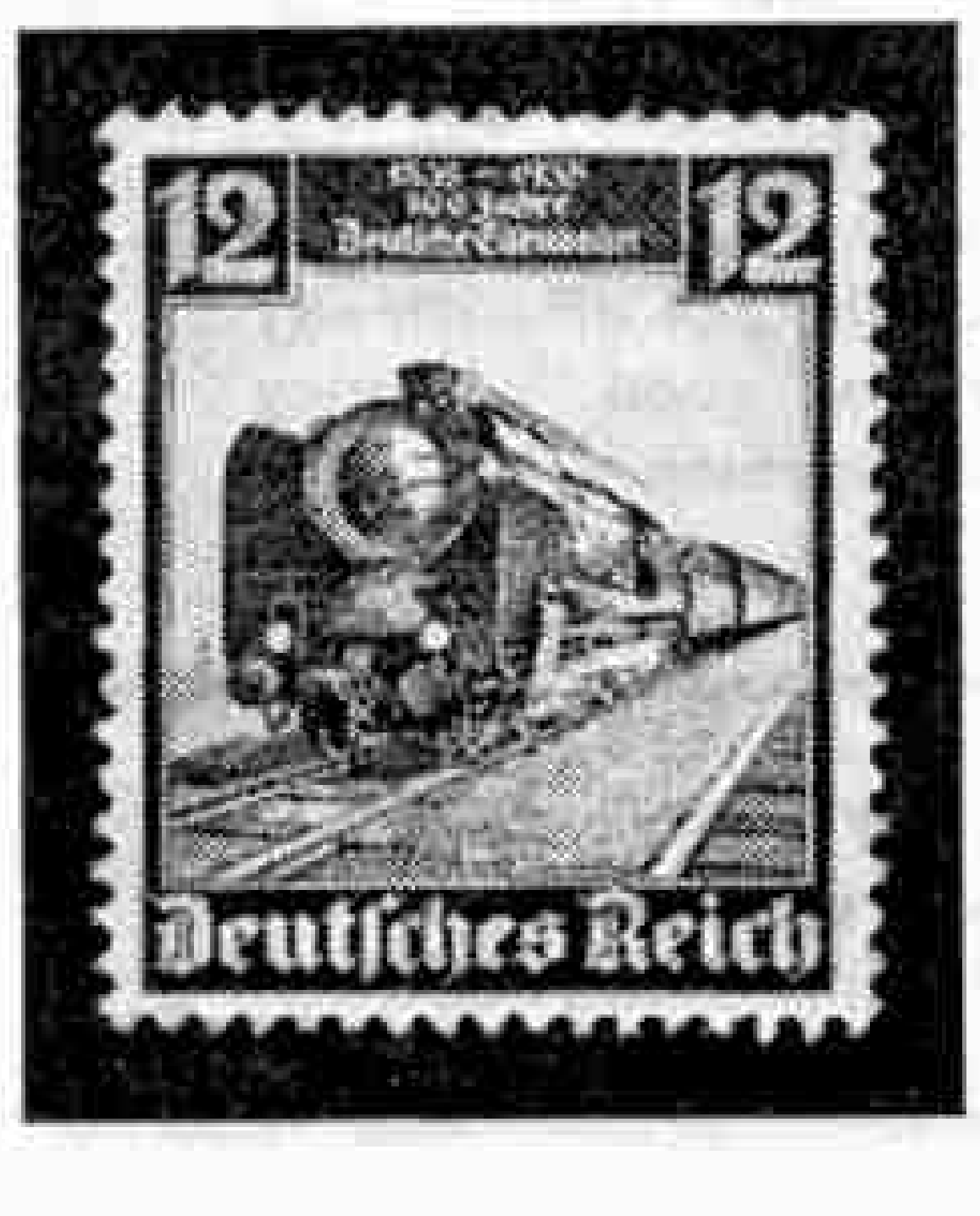


This locomotive was, of course, a rather later development than the earliest types of engine, such as Stephenson's "*Rocket*," and for illustrations of this type we must turn to the recent Belgian and German centenary issues, the 2 francs and 6 pfennigs values of which, respectively, feature the earliest stage of locomotive design. Here the tall chimneys of early days, the barrels carrying the water supply, and the simple driving wheels, are excellently depicted.

A most interesting "single-wheeler" stamp is provided by the 3c. value of Uruguay's 1895 issue. In many ways this is, indeed, the item of greatest interest to a British railway enthusiast. The locomotive is none other than one of the famous Stirling "single-wheelers" designed for use in Britain on the old Great Northern Railway.

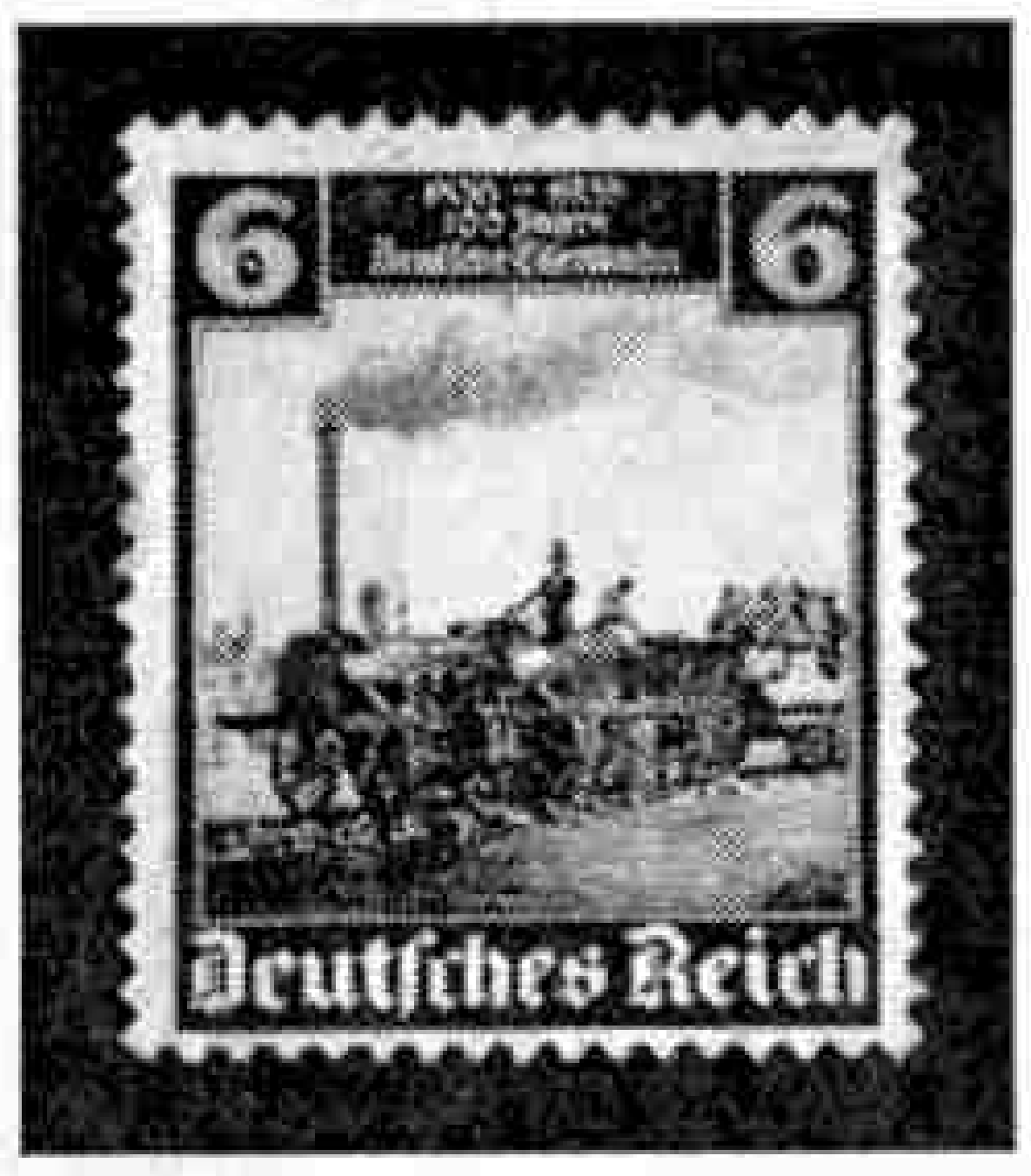


As our illustration shows, the outstanding feature of the engine, apart from the general grace of its design, is the huge single driving wheel. Stirling's first "single-wheelers" had driving wheels 7 ft. 1 in. in diameter. Subsequently the size was increased still further, and when the new direct line from Doncaster to York via Shaftholme was opened in 1870, Stirling introduced the first of the famous "eight footers." These were so successful that for over 25 years they hauled all express passenger traffic over the Great Northern route and played a very prominent part in the "race to Scotland" that took place in 1895.



The first of Stirling's "eight footers" is housed to-day in the railway museum at York, where it has remained since it was taken in 1925 to make a final public appearance under steam at the Railway Centenary celebrations at Darlington. Uruguay's first railway was opened on 1st January, 1869, so that the country had had more than 26 years of railway operation at the time this stamp was featured.

The stamp designers of the American continent have always recognised the interest of railway designs and there is a big number of stamps that could be used in a collection such as we are contemplating now. Notable among these are the 2c. value from the series commemorating the Buffalo Pan-American Exhibition of 1901, showing an express train of four Pullman cars hauled by a then up-to-date 4-4-0 express passenger locomotive. Even more interesting is the 5c. value of the 1912 parcel post series showing a mail train approaching a wayside mail delivery apparatus on which a "pouch" of mail is hanging ready to be picked up. This is the finest illustration in our collection, and it is unfortunate that the type of the locomotive cannot be identified definitely. The leading wheels apparently are of the same size as the "drivers" and as the connecting rod is not clearly drawn we are left in doubt as to whether the wheel arrangement is 4-4-2 or 2-6-2.



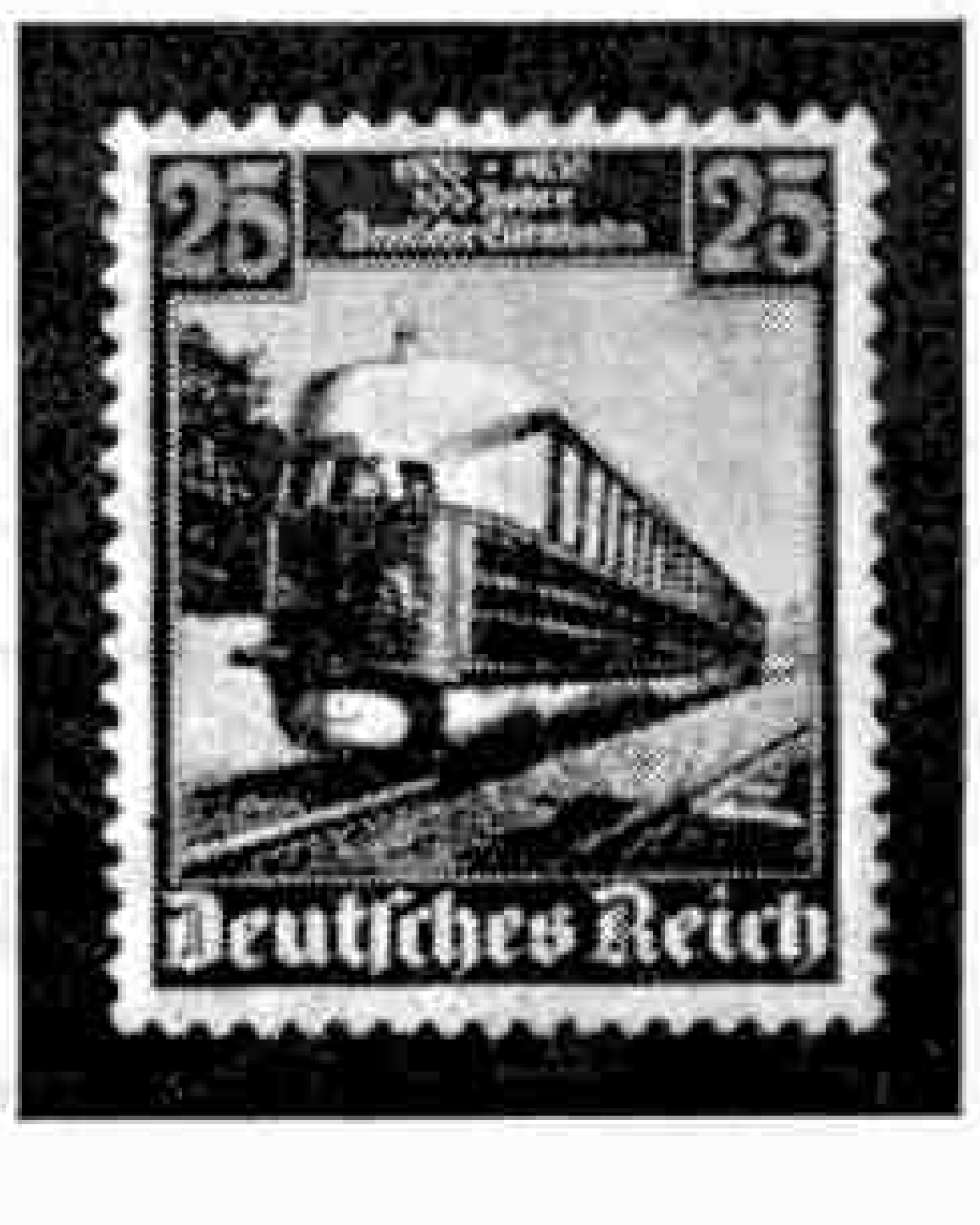
The designs of the 1912 parcel post stamps were devoted to an exposition of the United States mail delivery system, and they included one other fine railway design. This was the 3c. value showing a postal clerk leaning out of the doorway of a mail train in the act of hanging a sack of mail in position on the arm of the mail delivery apparatus, in readiness for transfer at an approaching wayside station.

Another stamp from the American continent is the 5c. from Newfoundland's 1928 publicity issue. This is a splendid picture of an express passenger train roaring its way across the island. The size is somewhat too small to make it possible to identify the type of locomotive from the stamp itself, but it may safely be taken to be one of the "Pacific" (4-6-2) engines customarily used on the cross-country express service between St. John's and Port-aux-Basques, a 547-mile run that is performed thrice weekly in each direction.

The Belgian and German centenary issues provide illustrations of modern practice in locomotive design and thus the 12 pf. German stamp shows a modern steam locomotive fitted with smoke deflectors, while the 25 pf. and 40 pf. and the 10c. Belgian stamp show "streamline" types.

The 25 pf. German stamp illustrated shows the "*Flying Hamburger*" a streamlined, articulated, Diesel-engined railcar unit of the German State Railways. Until this summer it was the fastest train in the world, making an average speed of 77.4 m.p.h. between Berlin and Hamburg. Its success has led to the adoption of similar units in other countries for special high-speed services. In Germany itself considerable developments have taken place recently and a new improved Diesel unit of the same general type now takes the place of the "*Flying Hamburger*" as the world's fastest train. This runs from Berlin to Hanover at a speed of 82.25 m.p.h.

The 40 pf. stamp may be taken as representative of recent attempts to provide a streamlined contour for steam locomotives. The engine illustrated on this stamp is one of a special high speed 4-6-4 type, sheathed with metal casing intended to reduce air resistance. In official trials the second engine of the series attained a maximum speed of 119 m.p.h. between Berlin and Hamburg.



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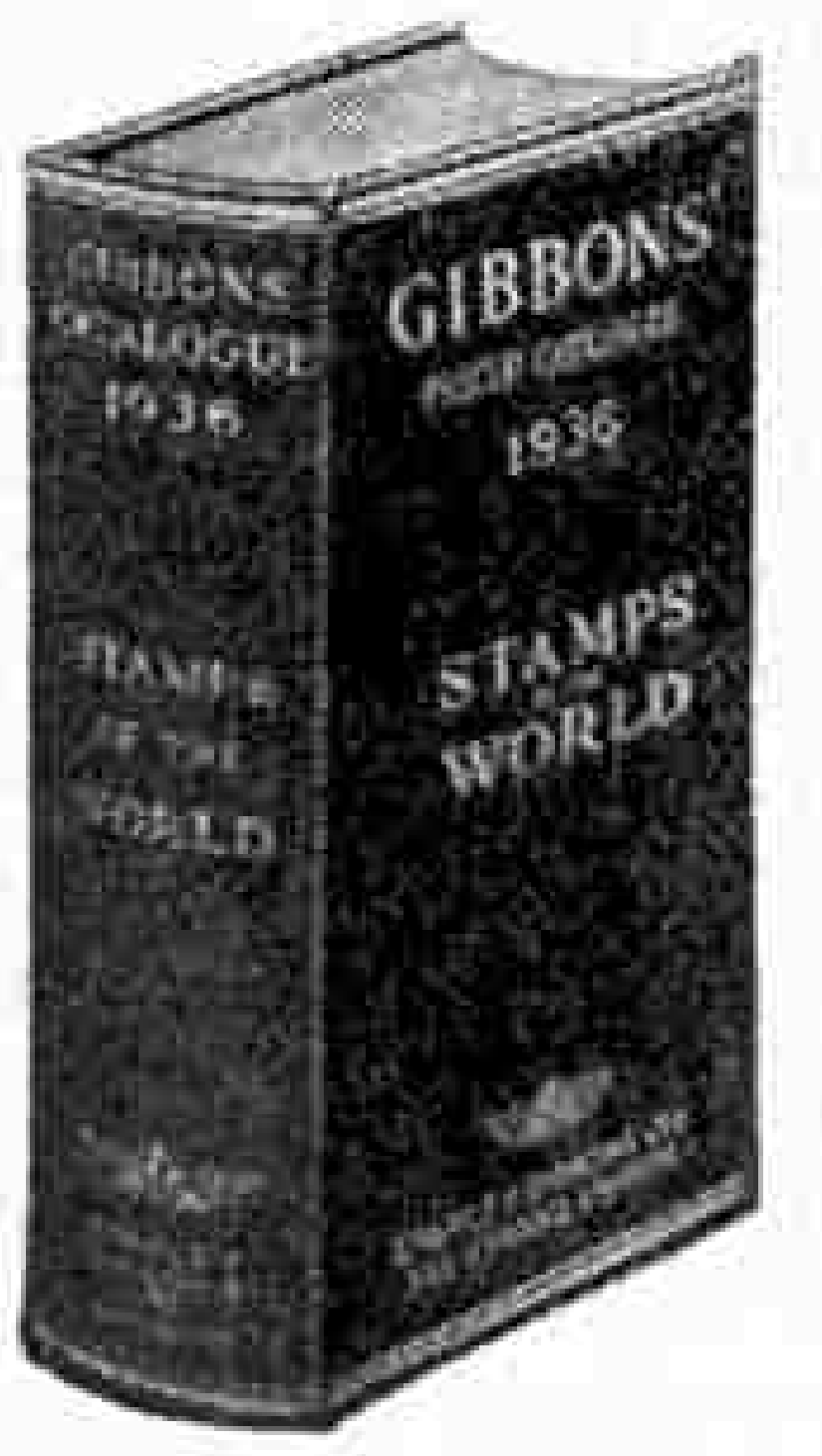

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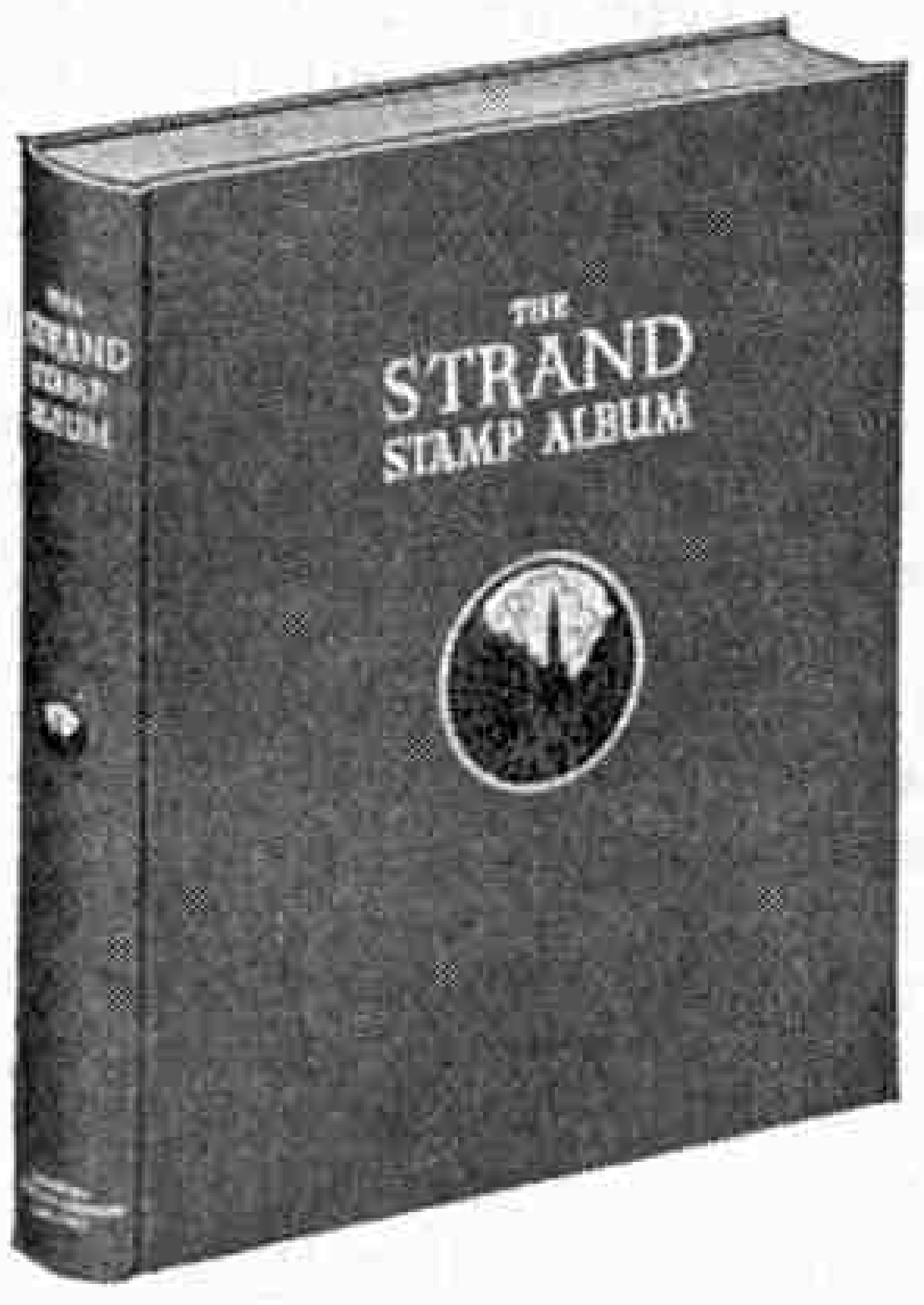

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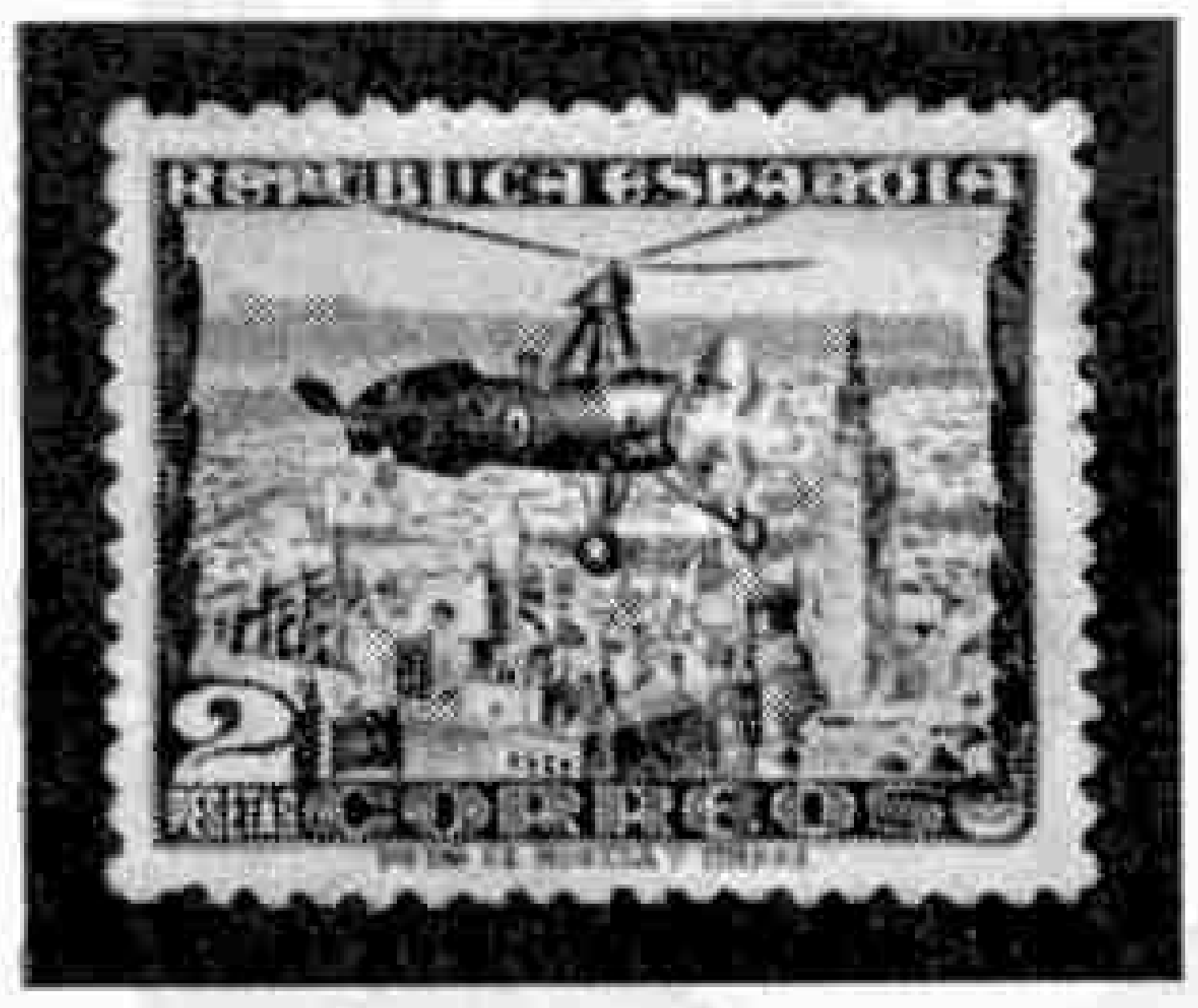
Stamp Gossip
and Notes on New Issues

An Autogiro Stamp

Those of our readers who are compiling a stamp history of aviation will welcome the new 2c. Spanish issue with its excellent picture of an autogiro machine, reproduced here. The design shows the autogiro flying over Seville, in which city Senor de la Cierva did much of his early experimental work. The inventor first projected the machine in 1920, but it was not until 1923 that the first successful flights were performed. In 1928 a cross-channel flight was achieved, since when the machine has been adopted very widely for special civil and commercial purposes.



The new stamp is not an air stamp, it should be noted. It is an addition to the ordinary postal issue.

Gibbons Air Stamp Catalogue

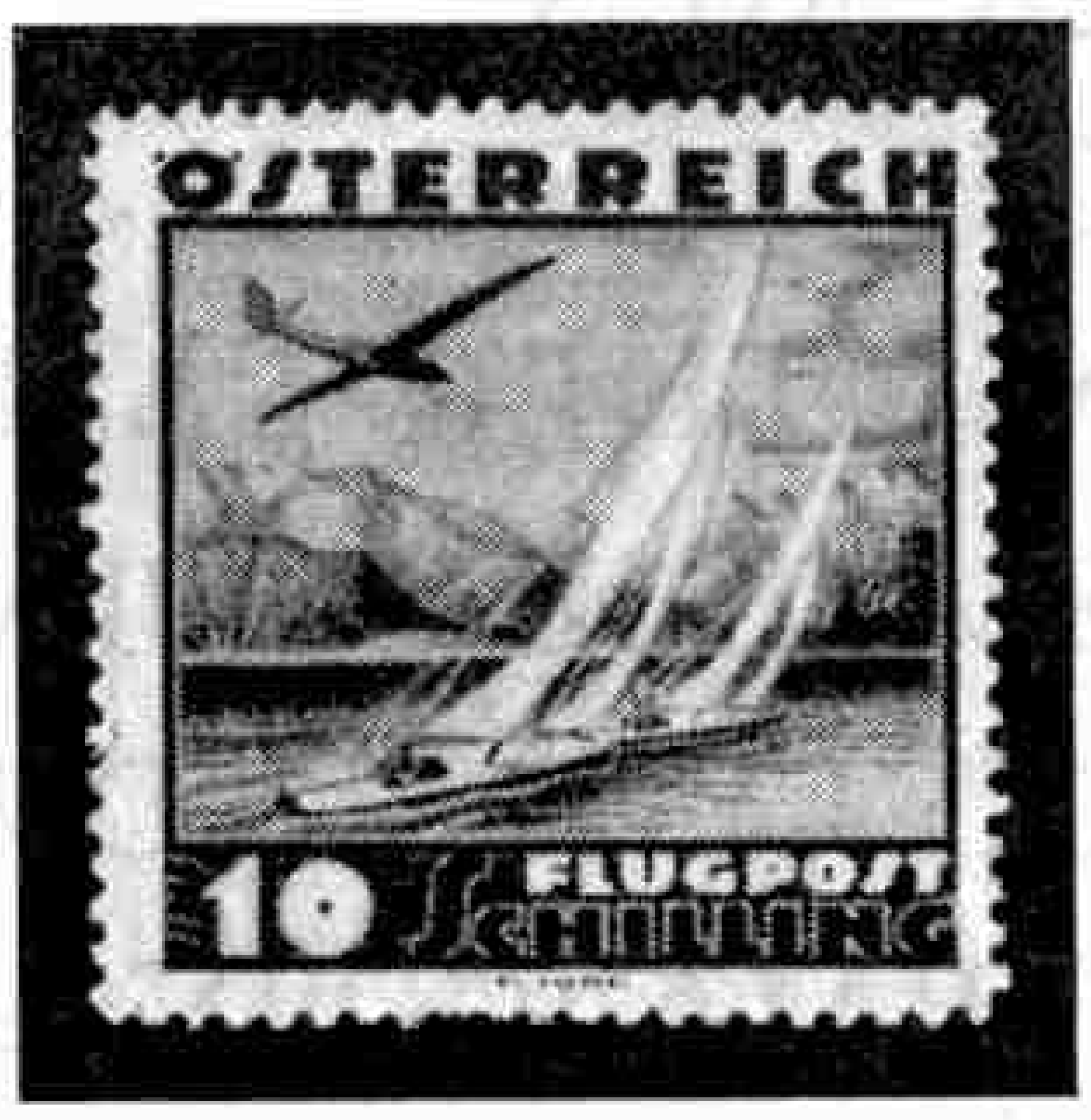
The growth of public interest in aviation and everything connected with it explains the phenomenal popularity that air-stamp collecting is experiencing to-day. So great indeed is this popularity that Stanley Gibbons Ltd., have been compelled to produce a fourth edition of their *Air Stamp Catalogue* less than a year after publication of the third edition.

A glance through the new volume demonstrates the immense interest that is to be found among air stamps. Many of them, notably the Hawker, Alcock, De Pinedo, Columbia and DO-X issues, the stamps of Newfoundland and the Kingsford Smith issue of Australia, are actual souvenirs of great and historic flights. Others bear striking designs of famous aircraft, the 'planes of the Wright Brothers, Bleriot and Lindbergh, among others, or portraits of early pioneers of flying such as Santos Dumont, Count Zeppelin, Lilienthal, and Leonardo da Vinci.

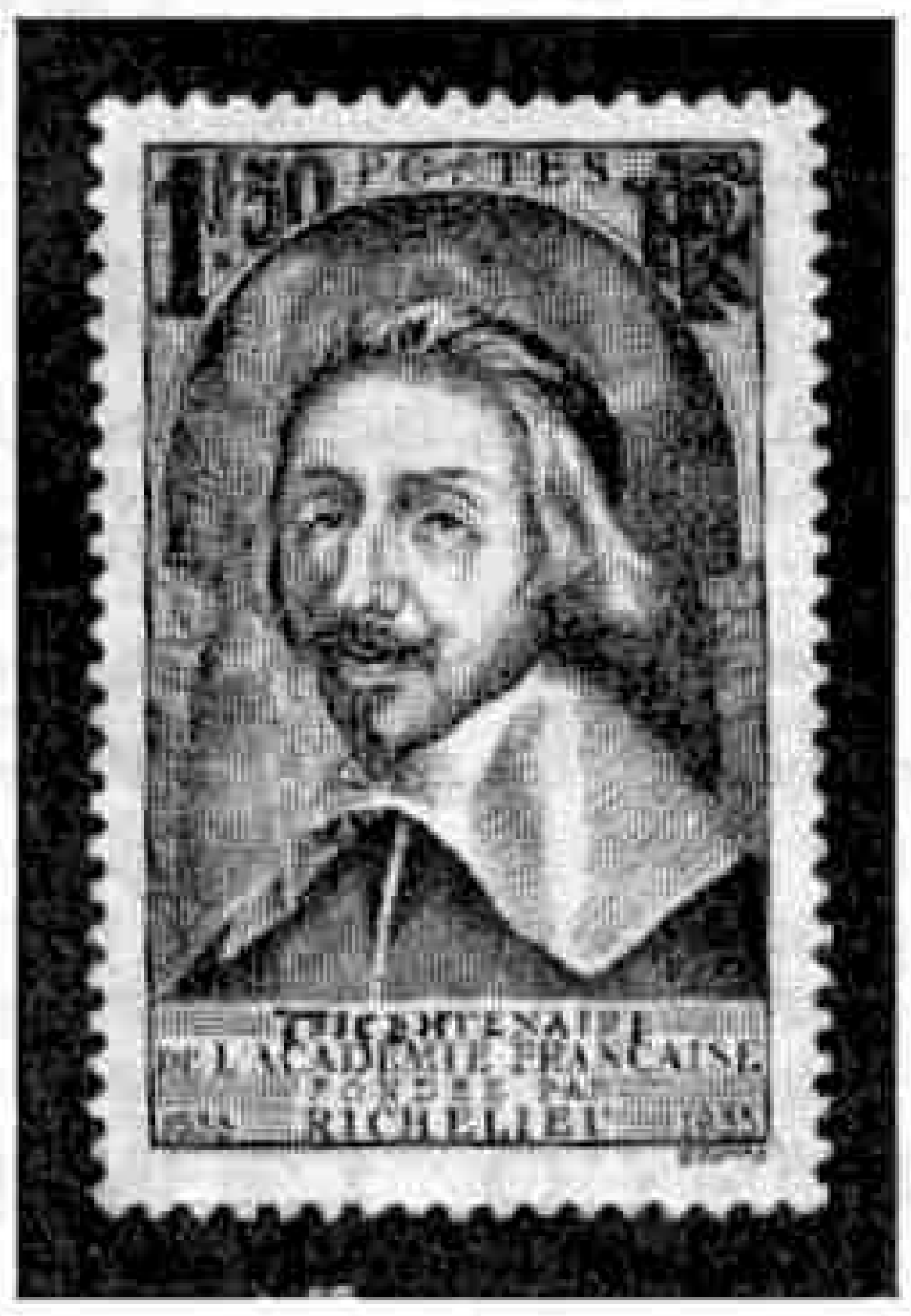
This splendid catalogue contains nearly 200 pages and 774 illustrations. It may be obtained from any stamp dealer price 1/6, or direct from Stanley Gibbons Ltd., 391, Strand, London, W.C.2, price 1/9, post paid.

French Academy's Tri-Centenary

To commemorate the 300th anniversary of the founding of the French Academy, France has issued a new 1f50 stamp bearing a portrait of Cardinal Richelieu. The actual date of the foundation of the Academy was 1629, but it was not until six years later that official recognition was accorded by Louis XIII. Since then the Academy has been the arbiter on all matters of French language, life and customs. Its membership is limited to 40 at any one time, and all the great figures of French literature, with but one or two exceptions, notably Molière and de Maupassant, have been counted among the "Immortals," as the members are known.



An interesting companion stamp is provided by the new 1f25 stamp commemorating the 50th anniversary of the death of Victor Hugo whose place in French literature is analogous to that of Shakespeare in English literature.



Victor Hugo was born at Besançon in 1802 and began to write at the age of 14. Before his 20th birthday he had gained several prizes for poetry and he speedily forged ahead until by the time he had reached the age of 30 he was the acknowledged leader of young literary France. Possibly because of that leadership his first proposal for admission to the Academy in 1836 was refused, and it was not until 1841 that he was elected to sit with the "Immortals."

Queen Astrid Mourning Stamp

Belgium is to issue this month a special mourning stamp in memory of the late Queen Astrid. The face value of the stamp will include a small premium for charitable funds, probably for the Anti-tuberculosis campaign.

Stamps in Glass

The largest stained glass window ever erected in South Africa is to be built with the new General Post Office at Johannesburg, and the principal features of the window will be huge reproductions of the Union's current ½d., 1d., 2d. and 4d. stamps, accurately copied even to the tiniest detail.

The usual heraldic features will be linked with pictures symbolic of modern methods of communication, a streamlined train, a motor ship, a wireless station and an aeroplane. Old-time mail coaches and other ancient forms of postal transport will also be included.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

Austria's New Air Stamps

Austria's stamp designers can usually be relied upon to produce a range of popular new designs when called upon, and the new air stamp series lives up to the high standard of recent years.

We have not sufficient space here to describe each of the 15 designs in detail, but the following are perhaps the most interesting: 15 gr. Durnstein on the Danube, showing the old ruined castle above the town. Richard Cœur-de-Lion for a time was held a prisoner in this castle by his rival, Duke Leopold VI. 20 gr., Hallstatt, Upper Austria, where, in the charnel house, there are to be seen thousands of human skulls, all identifiable by name, kept there because the burial ground has been full since the 15th century! 80 gr., a striking contrast in Viennese architecture. This design shows the 15th century Minorite church, and in the background the Hochhaus, a giant block of modern offices and flats. 25 gr., the viaduct on the Tauern Railway, connecting Salzburg with Trieste. 52 gr., the aerial railway on the Zugspitze mountain (9,725 ft.). This 2¼-mile long railway was opened in 1926 and ascends 5,187 ft. The 10 sch. value illustrates a yachting scene on the Attersee, Austria's largest Alpine lake, 19 square miles in area.

Each of the designs embodies an aeroplane or glider in the picture to link up with the air mail purpose of the stamp.

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For further stamp advertisements please see pages 678, 680 and xxviii

FIRESIDE FUN

THE PRICE OF IGNORANCE

Boss: "You ask high wages for a boy with no experience."

Boy: "Yes, sir, that is because the work is so much harder to do when you don't know anything about it."

* * * *

A man went into a printer's and asked: "How do your envelopes run?"

The salesman replied: "Sorry, sir; our envelopes do not run; they are stationery."

* * * *

Policeman (to boy in pond): "Hey! Don't you know it's against the law to swim here?"

Boy: "Aw, that's all right, sir, I can't swim, I am only bathing!"

* * * *

Stranger: "What are you men digging for?"

Workman: "Money."

Stranger: "When do you expect to strike it?"

Workman: "Five o'clock on Friday."

* * * *

Lady: "How would you like a nice chop?"

Weary Tramp: "That all depends, lady. Is it lamb, pork, or wood?"

* * * *

The following amusing note was pinned up in a P. and O. liner recently, by a native member of the crew:

"One day one European man take my fishing-line. But he no give to return. I don't know whichman. Two or three man looking to same me but many time I ask he say not I am. Therefore please to give whichever. Thank you return please."

* * * *

Teacher: "What is the mechanical advantage in having a pump with a long handle?"

Student: "So you can have someone to help you pump."

* * * *

"Daddy, I want to be an Arctic explorer."

"That's fine my lad."

"But daddy, I want to begin at once."

"What do you want to do?"

"I want sixpence a day for ice-cream, so that I can get used to the cold."

* * * *

Jones: "This is a very long pie."

Bones: "Well, it was long rhubarb."

* * * *

Mrs. Nurich was bragging about her visit to South America.

"What a wonderful time you must have had," said one of her hearers. "I suppose you went up the Amazon?"

"No," replied Mrs. Nurich. "My husband went to the top, but I never did care for climbing."

* * * *

CUTTING

Sergeant-Major: "Did you shave this morning?"
Recruit: "Yes, sergeant."
Sergeant-Major: "Use a glass?"
Recruit: "Yes, sergeant."
Sergeant-Major: "Well, use a razor next time."

THEN HE "UNDER-STOOD"

Magistrate: "You say you stood up?"

Bumptious Witness: "I said I stood. If one stands, one must stand up. There is no other way of standing."

Magistrate: "Oh, isn't there? Two pounds for contempt of court. Stand down."

* * * *

Artist: "You must be very careful with that picture, it is not dry yet."

Porter: "That's alright sir, I've got an old coat on."

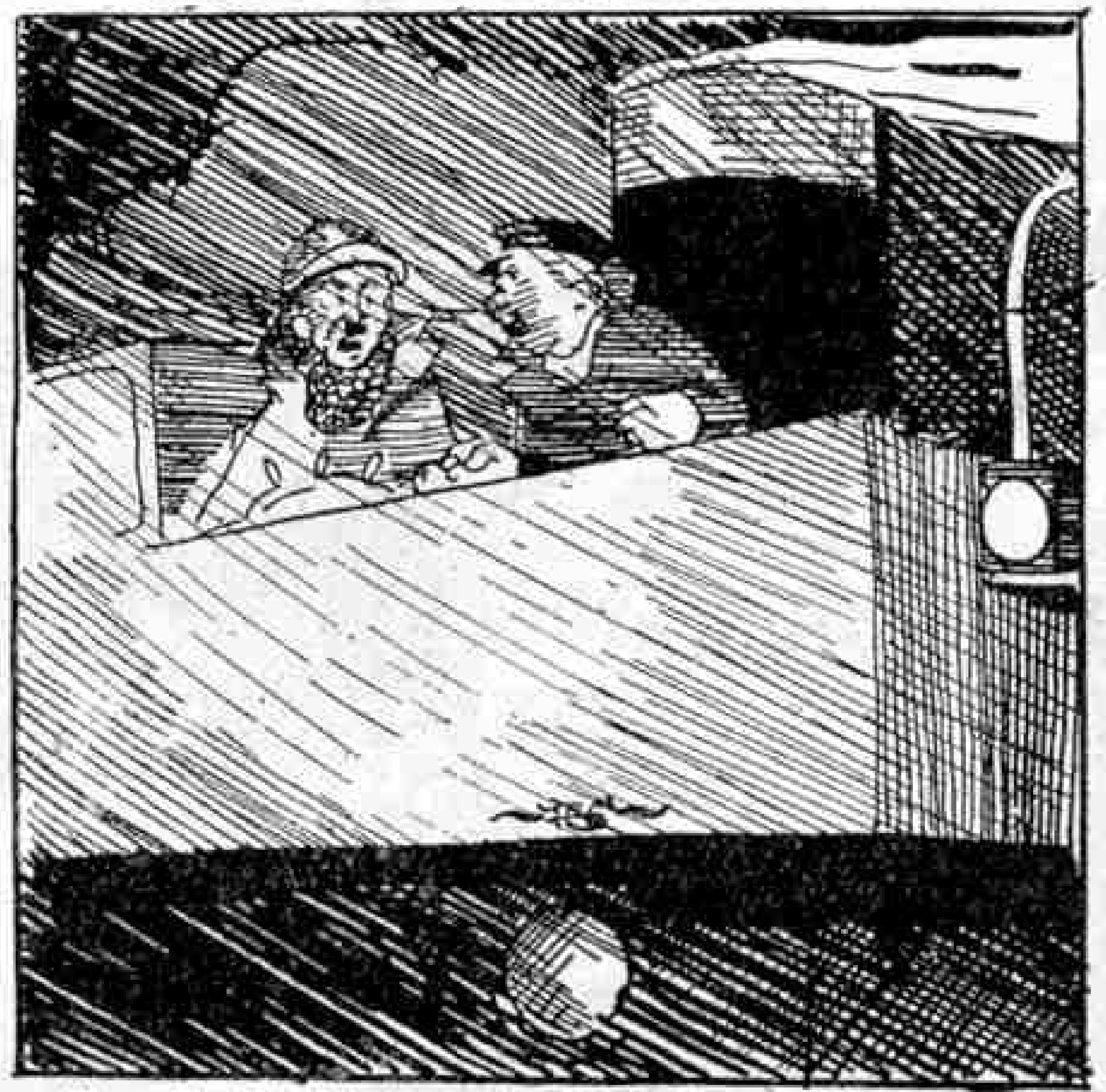
* * * *

A county cricketer, returning to the pavilion after making his second duck of the match, was stopped by a small boy.

"Here you are, mister," said the lad sorrowfully. "You can have yer autograph back."

* * * *

RENEWING ACQUAINTANCE



The pilot had taken charge of the vessel on coming into the harbour. The night was dark, with driving rain. Suddenly the ship grazed a rock.

The captain raved. "I thought you said you knew every rock in this harbour," he yelled.

"I do," replied the pilot. "That was one of them."

* * * *

A negro who was well known to the judge had been arrested on a charge of having struck a relative with a brick. After the usual preliminaries the judge inquired: "Why did you hit this man?"

Negro: "Jedge, he called me a black rascal."

Judge: "Well, you are one, aren't you?"

Negro: "Yessah, maybe I is one. But, jedge, s'pose someone'd called you a black rascal, wouldn't you hit 'em?"

Judge: "But I'm not one, am I?"

Negro: "Naw, sah, you ain't one; but s'pose someone'd call you de kind of rascal you is, what'd you do?"

* * * *

A man named Dodgin was appointed foreman at the works, but his name was not known to all the men under him. While on his rounds, he came across two men sitting in a corner smoking. "Who are you?" asked one of the men.

"I'm Dodgin, the new foreman," he replied.

"So are we; sit down and have a smoke."

* * * *

Cannibal Chief: "What was your job in your own country?"

Shipwrecked Man: "I was an assistant editor."

Cannibal: "Well, you'll soon be editor-in-chief."

* * * *

Tom: "I want a piece of rope, please."

Shopkeeper: "How long?"

Tom: "Long enough to reach from my pig to the wall."

* * * *

Waiter: "I have stewed kidneys, boiled tongue, fried liver and pig's feet."

Diner: "I am not interested in your troubles. Give me a cheese sandwich."

* * * *

Pob: "He's not as big a fool as he used to be."

Job: "Is he getting wiser?"

Pob: "No—thinner."

NO HURRY

It was a cold February morning and the sheriff had gone to the cell of Mose Jackson, who was to be hung the next day.

"For your last meal you can have anything you want and as much of it as you want," said the sheriff. "What would you like, Mose?"

"Ah believe Ah'd lak a nice watermelon," replied Mose.

"But watermelons won't be ripe for six months yet," said the sheriff.

"Ah kin wait, boss, Ah kin wait," replied Mose eagerly.

* * * *

Father: "What a boy you are for asking questions. I'd like to know what would have happened if I'd asked as many questions when I was a boy."

Son: "Perhaps you'd have been able to answer some of mine."

* * * *

Mrs. Smith: "Here, Tommy, run along and put this on a bus."

Tommy: "What bus?"

Mrs. Smith: "Oh, any bus. It's my husband's lunch, and he works in the Lost Property Office."

* * * *

The student was dissatisfied with the marking of his paper, and told his tutor so. "I don't think I deserve absolute zero for that," he said.

"I agree with you," replied the tutor, "but it's the lowest mark I can give."

* * * *

Teacher: "Can any pupil tell me what a buttress is?"

Tommy: "Yes, sir. It's a nanny goat."

* * * *

Boss: "You are half-an-hour late again. Don't you know what time we start work at this factory."

New Hand: "No sir, they're always at it when I get here."

* * * *

Wife: "If I were you, dear, I should not have fish. I've been told to-day that several people have been poisoned with it."

Husband: "Who told you that tale?"

Wife: "The butcher."

* * * *

Fond Mother: "Don't you think Bertie does wonderfully? He plays the piano entirely by his ear."

Visitor (in next room): "Really? But couldn't he do much better with his fingers?"

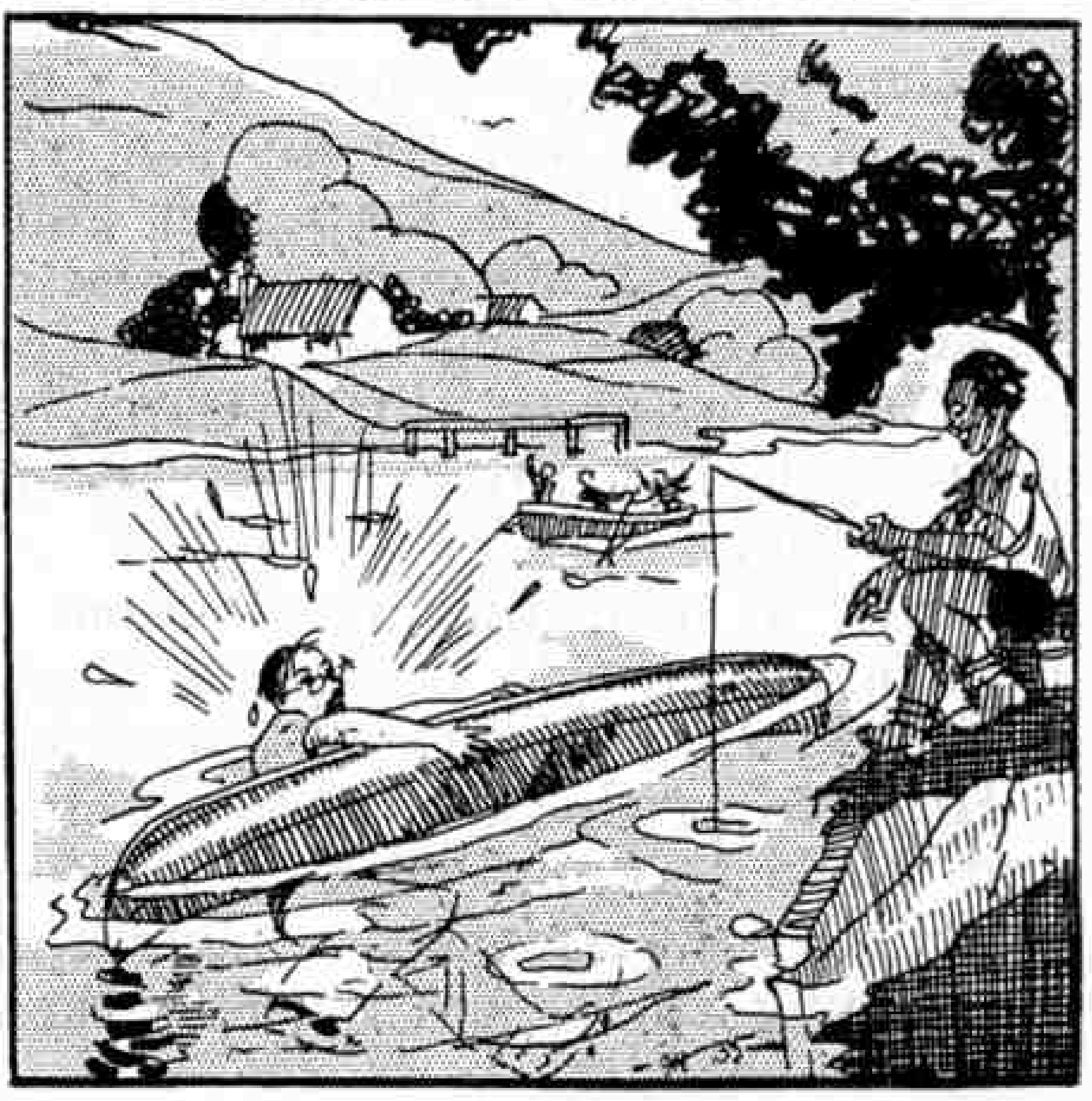
* * * *

Teacher (after lecture on steam engines): "Are there any more questions?"

Student: "Please, sir, How do you find the horse power of a donkey engine?"

* * * *

A GOOD OPPORTUNITY



Rude boy fishing on river bank (to upset canoeist): "While you're there, mister, you might look and see if me worm's off."

Buying a Dynamo

A True Story, by J.H.M.

I KNOW quite a lot about Electricity. For instance, I always re-charge our bell batteries myself with that salammoniac stuff, and so save the fee of the professional electrician, whom I only call in when the intricate mechanism of the bell itself goes wrong.

My son of eleven knows even more about Electricity than I do. The other day he coached me very carefully regarding the most important points of a small dynamo that I had promised to buy him. But I relied upon memorising those points instead of making notes, because that would have exposed my confusion of mind in regard to the electrical information he is constantly imparting to me. . . . However, I felt quite confident as I entered the shop to which I had been told to go.

"A small dynamo, please—for lighting electric lamps," I said airily.

"How many watts?" the young man enquired.

"Don't be rude," I said severely. "'How many whats' indeed. I spoke quite plainly—one small dynamo."

"But do you want to light 2 watt lamps, or 4 watts, or what watts?"

"Oh—watts! Yes, quite! Well—er—just about the usual number you know. I'm not quite sure."

"Well, do you know what voltage it's to be—how many volts?"

"How many volts?" I repeated vaguely, my confidence rapidly evaporating. "Yes, he'll want some volts, of course. It's for my son, you see—you'd better give me enough to keep him going for some time."

He looked at me curiously and seemed to be trying to swallow something he couldn't get down.

"That's a useful little thing," he said suddenly, putting a diminutive object on the counter. "Three pounds ten."

"Ah!" I said, turning it about for examination as if to make sure it was all it should be. "Rather too much—I want something about a guinea."

He then produced a thing about the size of an egg, and backed it up with a brief: "Nineteen-an'-six."

"H'm," I remarked thoughtfully, repeating the 'examining' process. "Where's the handle."

"What handle?"

"Don't you have to turn these things so many hundred times an hour to get electricity out of them?"

I was determined to show him I knew something about it.

"You have to turn that one four thousand times a minute to get anything out of it. That little pulley has to be connected with a machine of some sort."

I hedged.

"Oh—one of that type is it? I'm more used to the older kind. Well, I suppose it will do—it's only for a boy. It has plenty of vampires, I suppose?"

"Vampires?" he queried, blankly. Then, with sudden inspiration: "I suppose you mean *amperes.*"

"I *said* amperes. Do you think I don't know what an ampere is?"

He maintained a stony silence.

"Well—you haven't told me if it has a good supply of AMPERES!"

"It's 4 volts 1 ampere," he replied stolidly; then after a pause he added: "Nineteen-an'-six."

"Pity you couldn't tell me so at first," I said sharply, "without all that argument."

He did not reply, so I said I would have the dynamo, and told him to be sure and put plenty of volts and amperes in with it.

He made a strange noise that was half way between a choke and a sneeze, and for a moment I thought he was going to argue again. But he thought better of it and replied quite politely.

"We always keep them ready packed inside the dynamo, sir. It keeps them dry. Tell your son to count them and if there are any short, we will make good the shortage with pleasure."

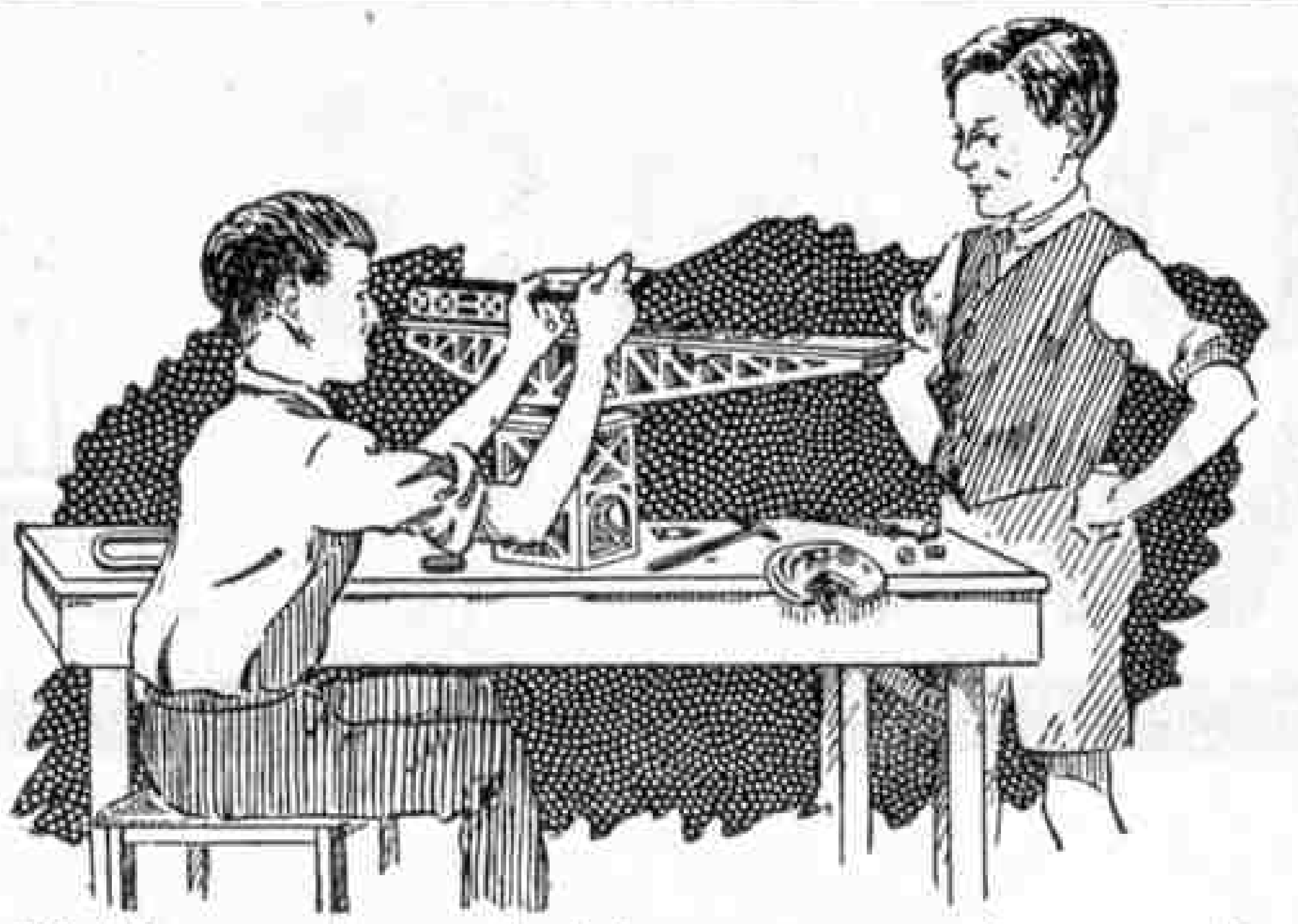
I concluded from his sudden change of manner that he realised I knew something about dynamos, and was not to be trifled with, but I had some misgivings on that point when I reached home.

My son at once plied me with eager questions as to how I had managed and had I bought his dynamo.

"Oh, yes," I said casually, "there's no difficulty about buying a dynamo if you know what you're doing!"

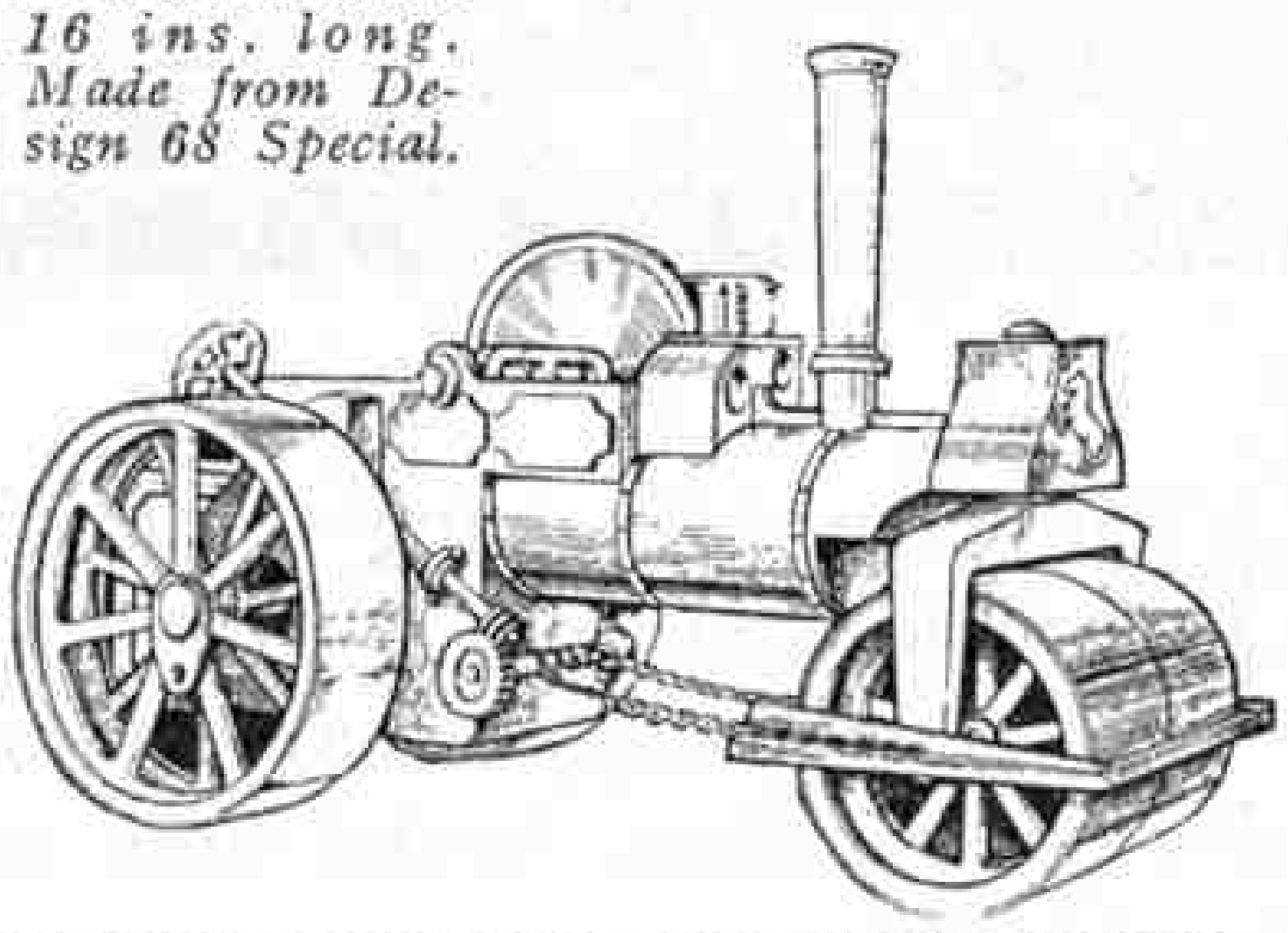
As I gave him the dynamo I delivered the assistant's message and to my astonishment he promptly went off into outrageous shouts of laughter, and refused to tell me what he was laughing about!

"H'm!" I remarked . . . "Where's the handle?"



Models you can make in wood

JOLLY good fun too. Cutting them out from the patterns provided is quite easy, and fitting the parts together is as good as any builder's job. Ships, locomotives, buildings, cranes—lifelike and workable—cut out in wood with a fretsaw. A great game for spare time—to say nothing of prizes to be won with the models at the school exhibitions. A set of necessary tools—a Hobbies Fretwork Outfit—costs as little as 1/6, and free patterns are given with Hobbies Weekly.



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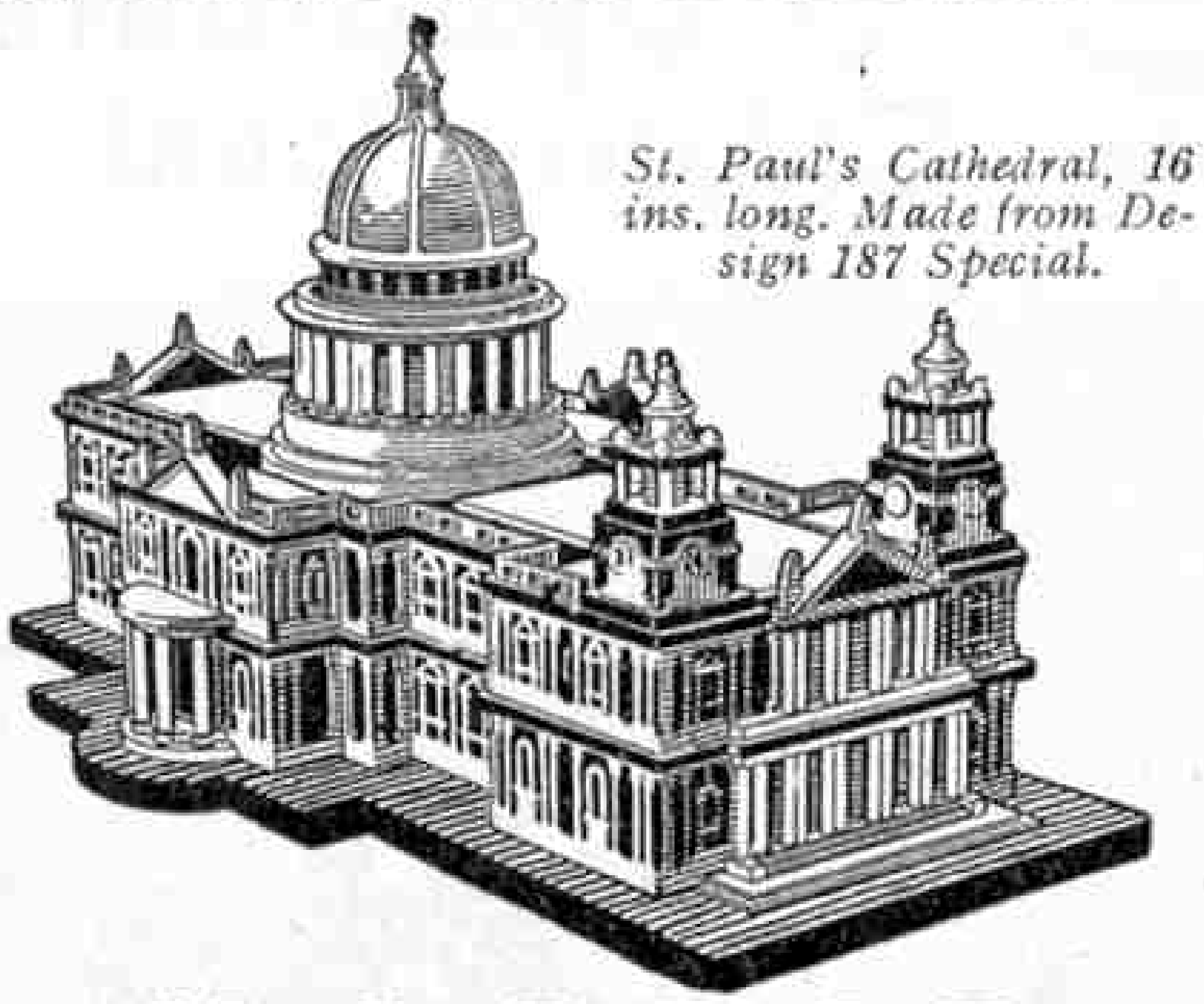
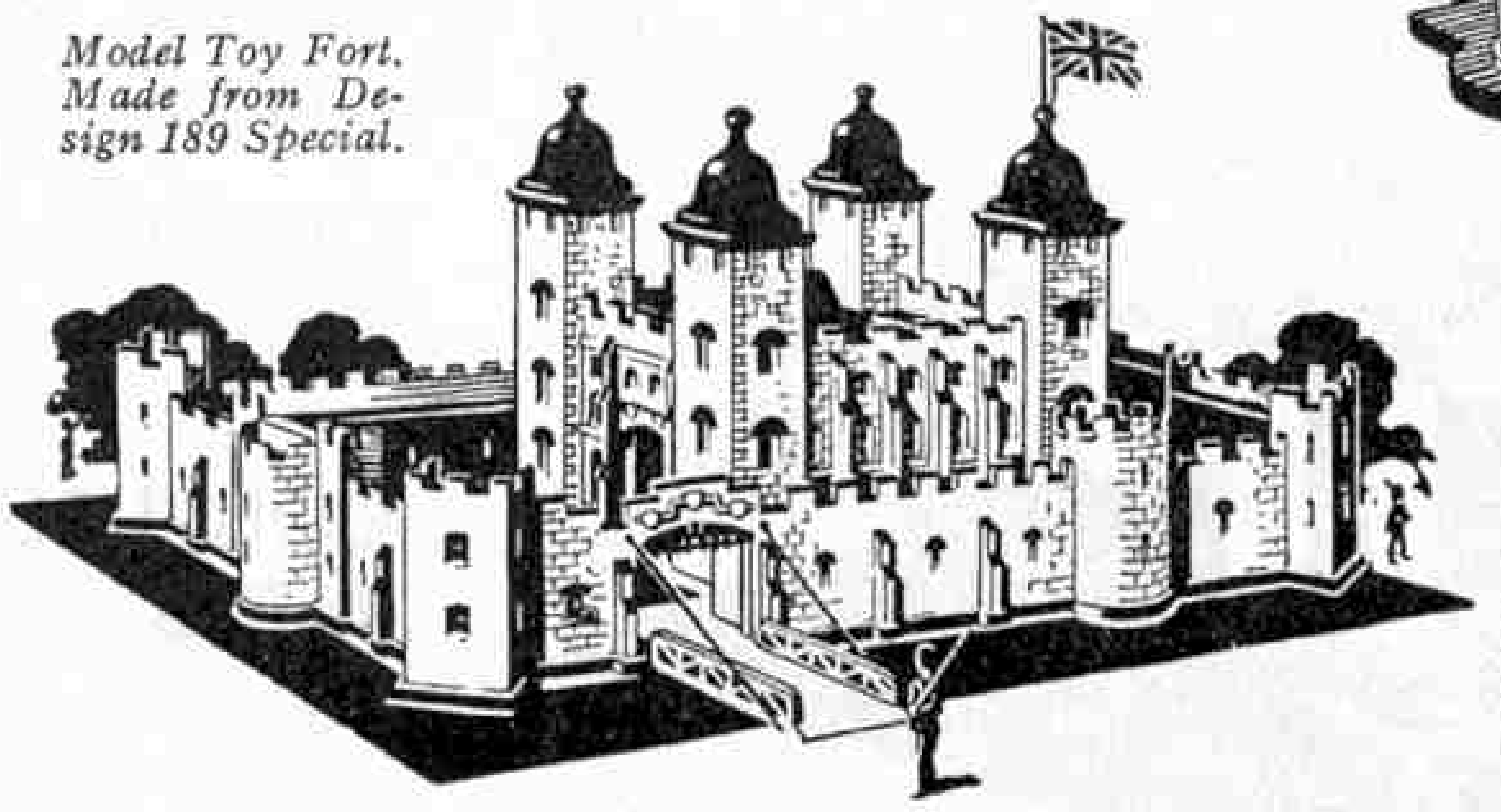


St. Paul's Cathedral, 16 ins. long. Made from Design 187 Special.



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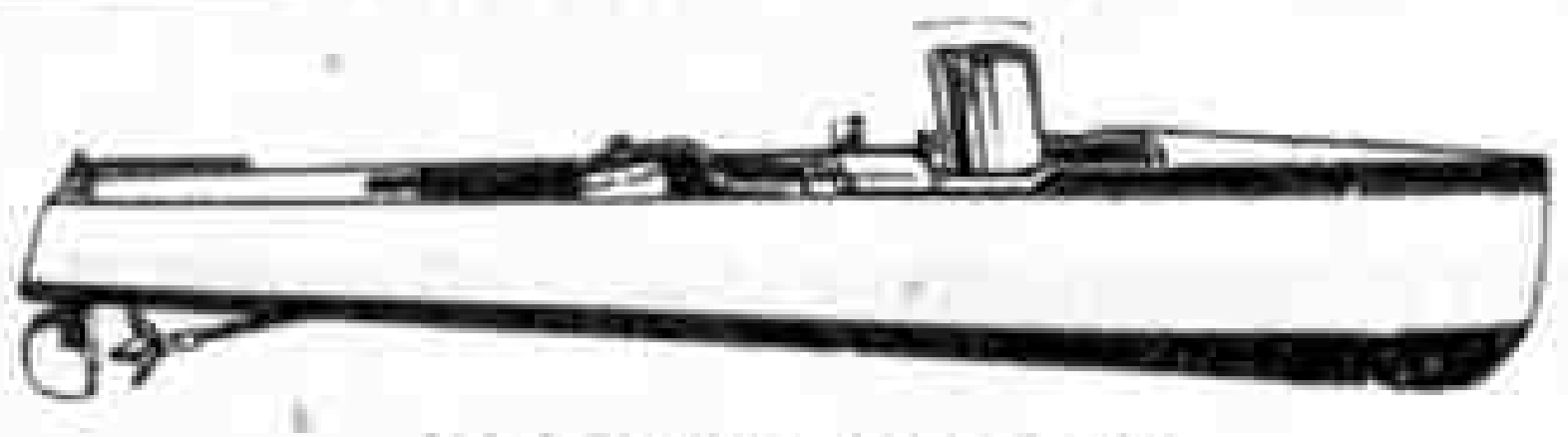

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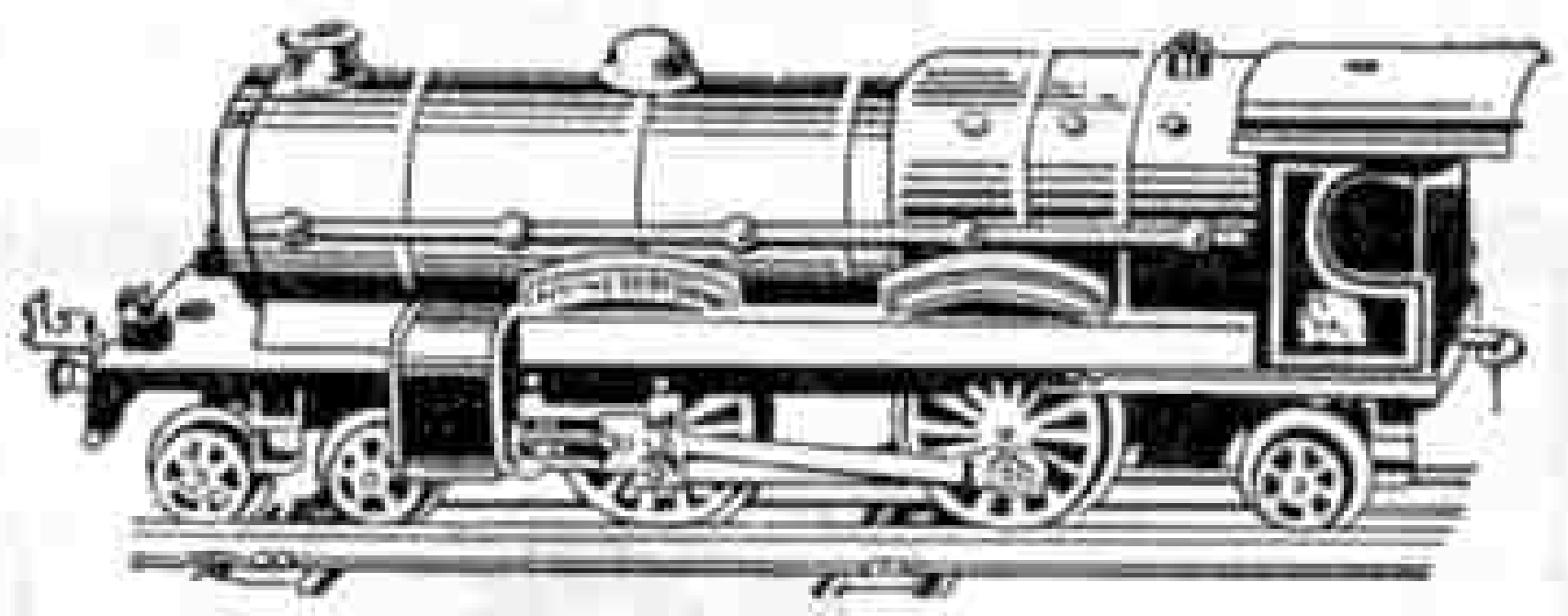

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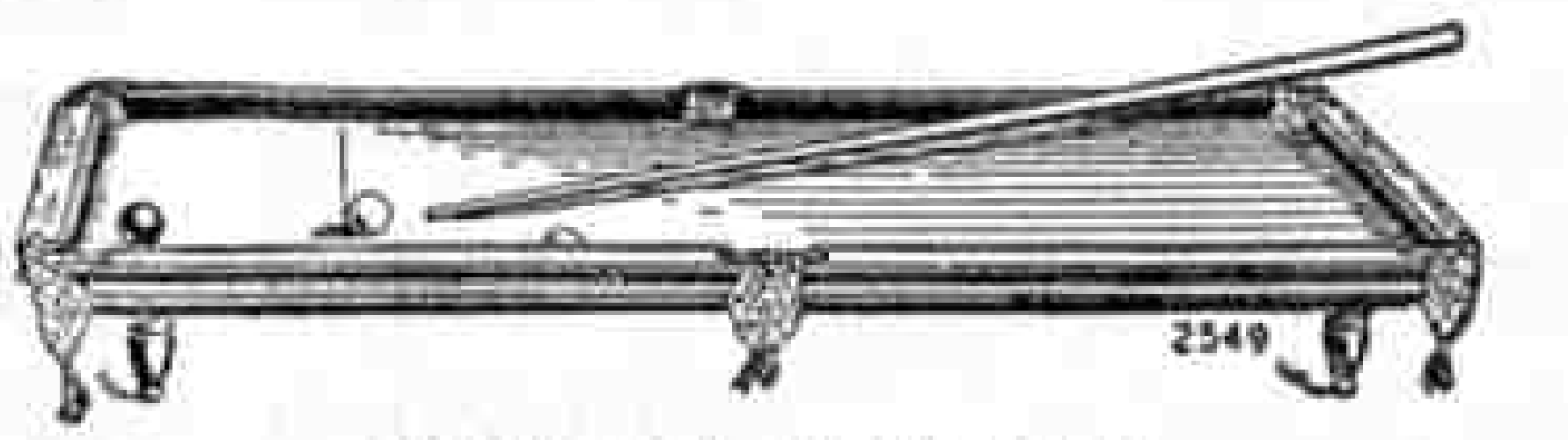

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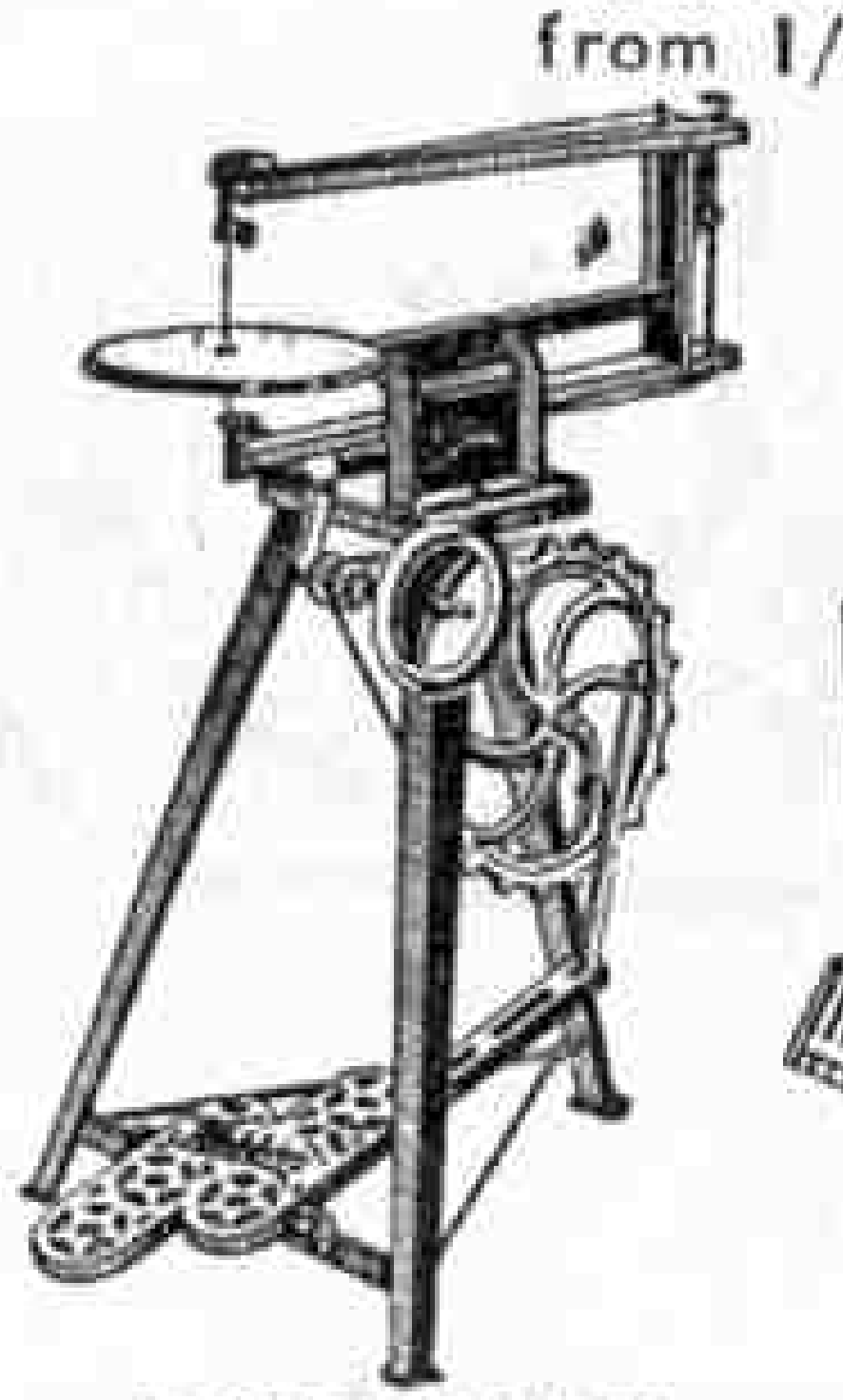

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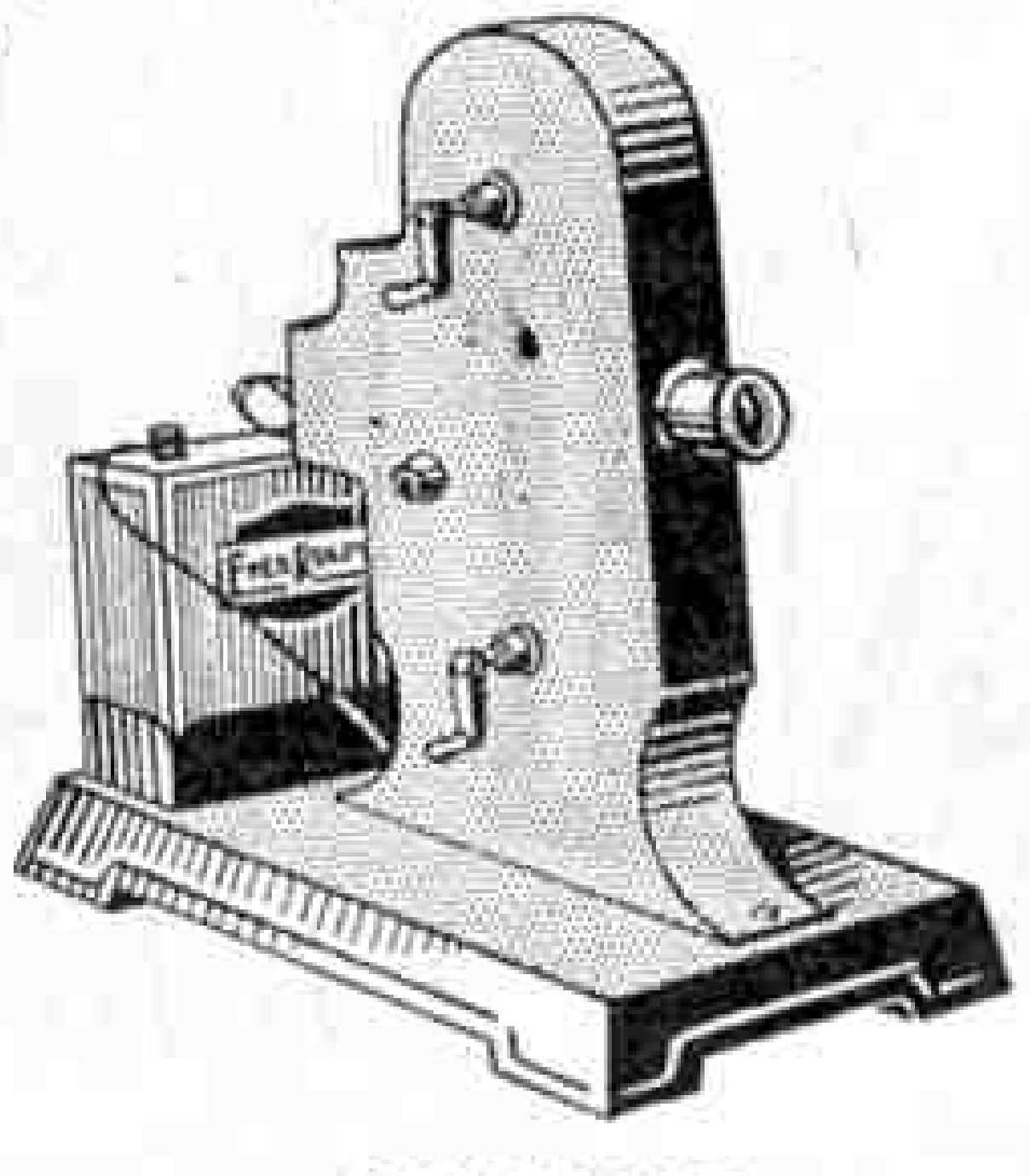

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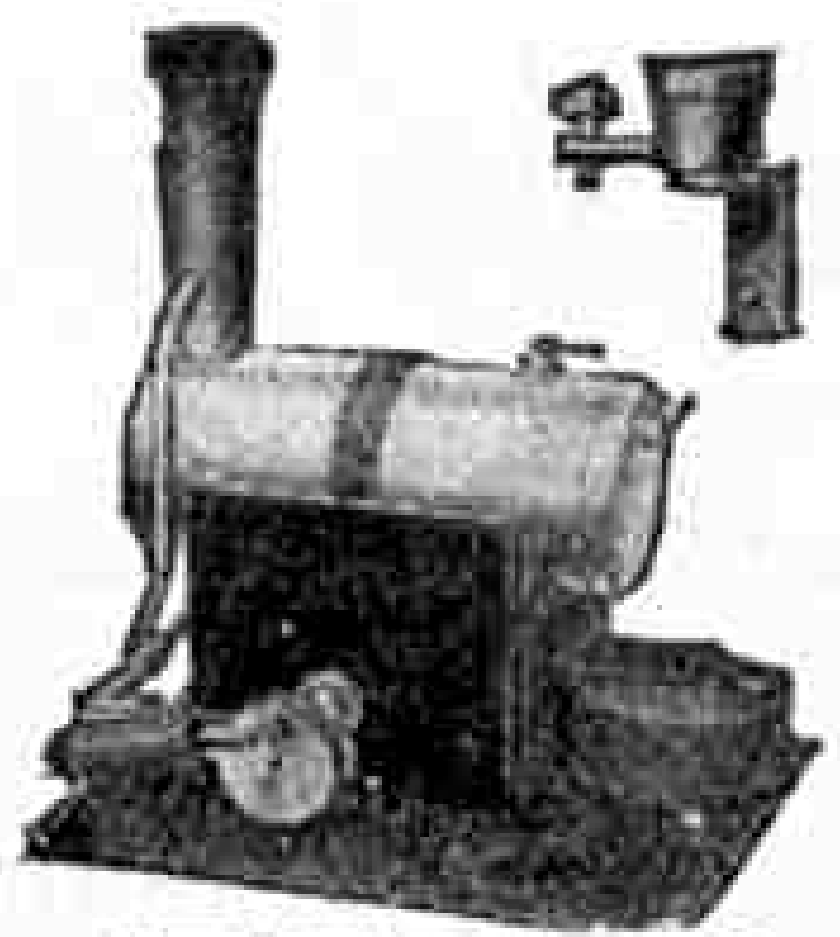

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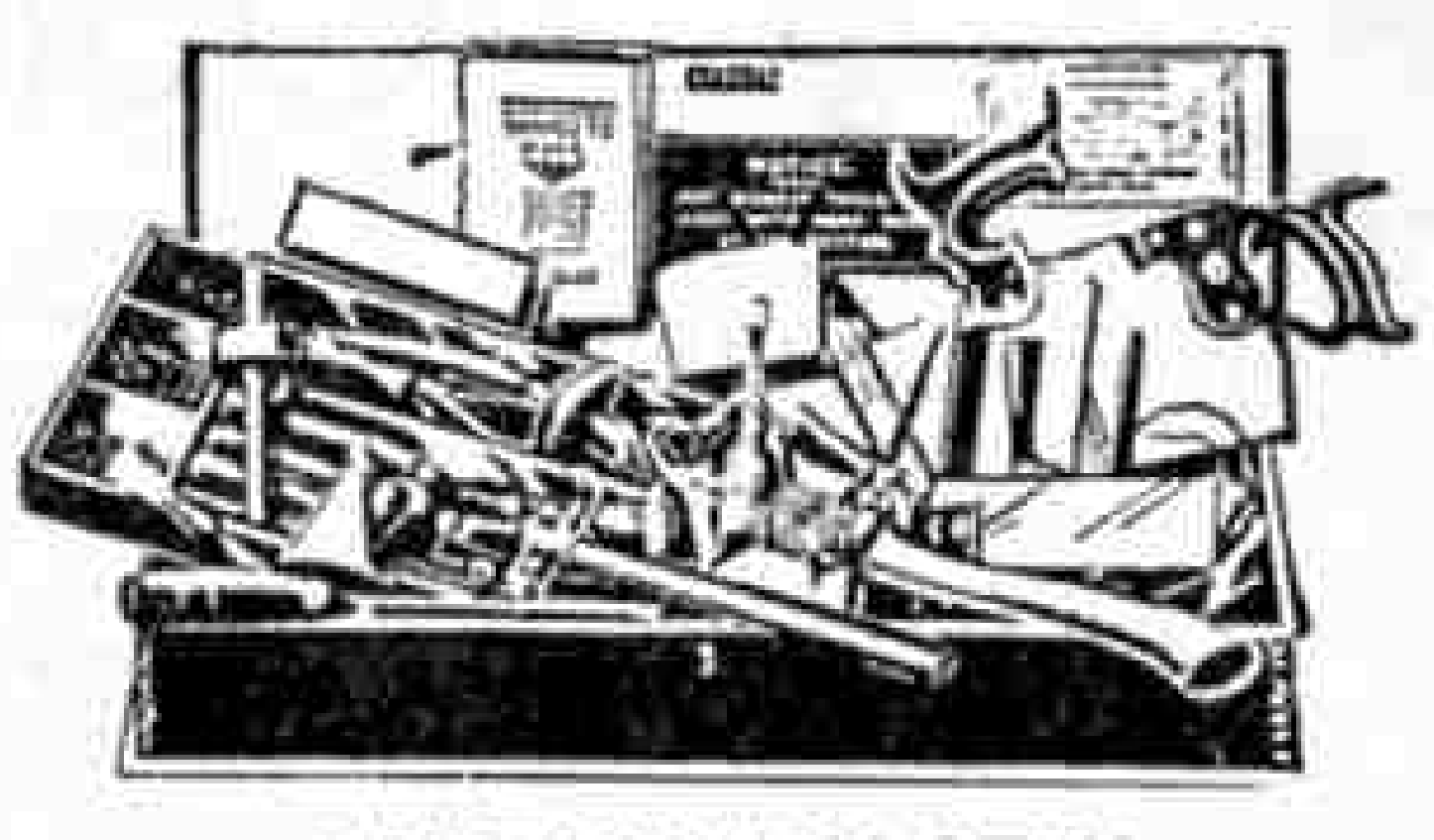

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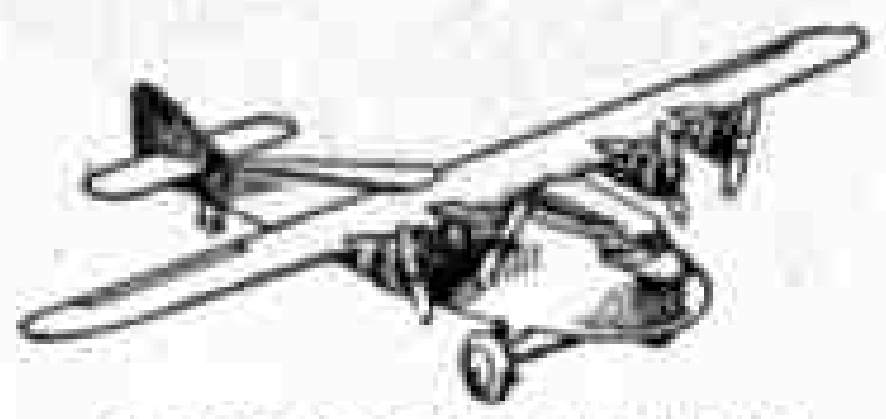

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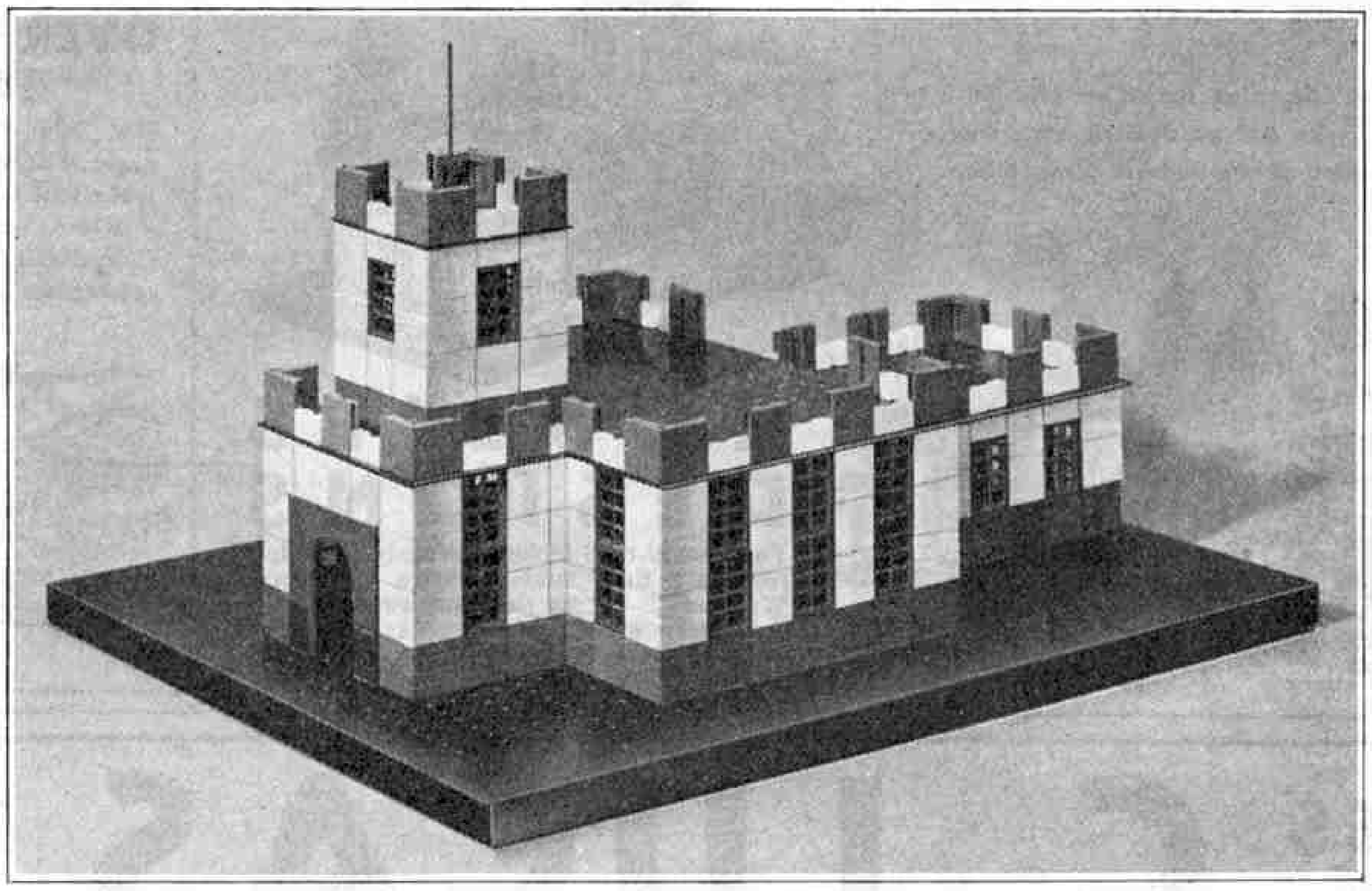

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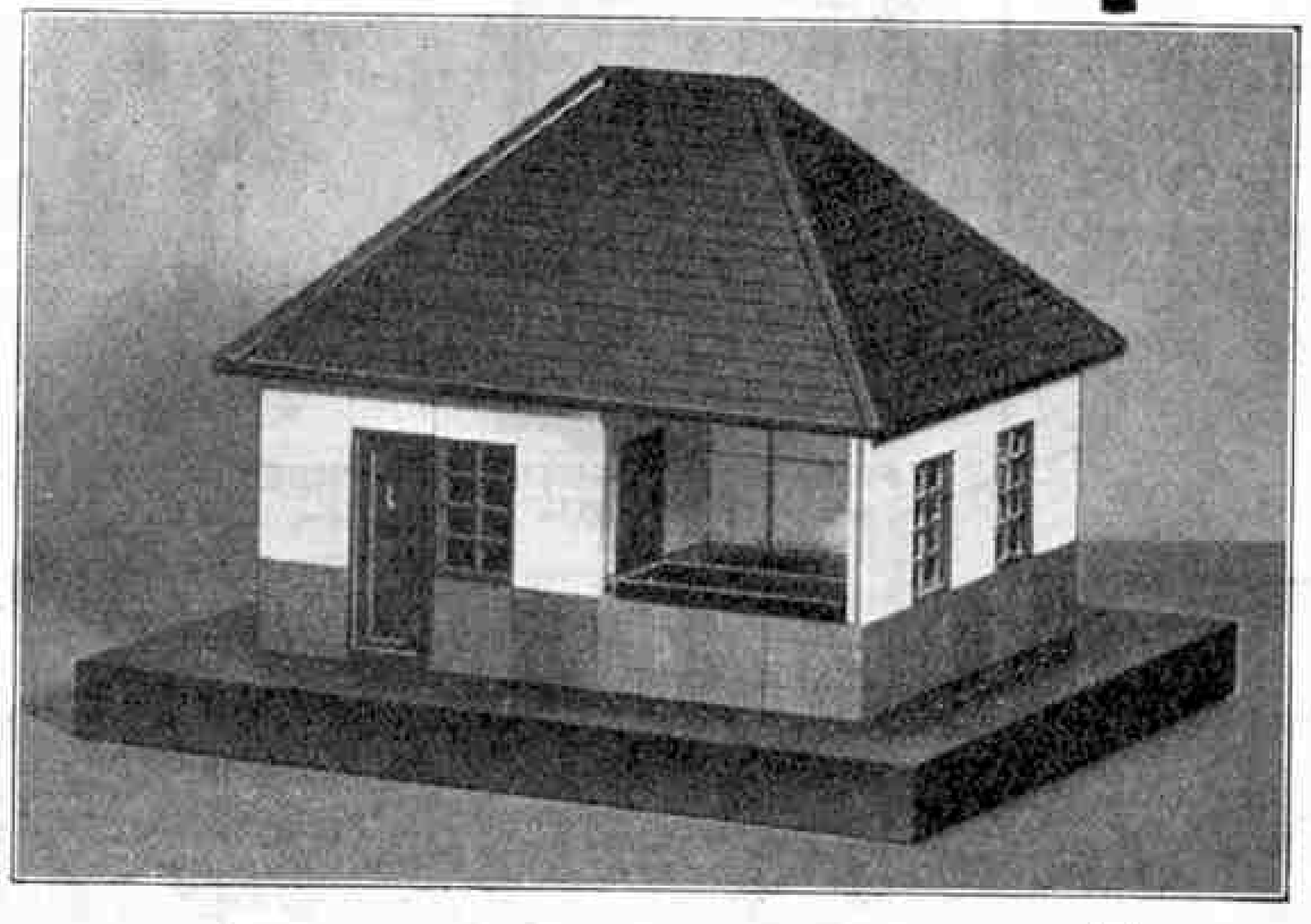

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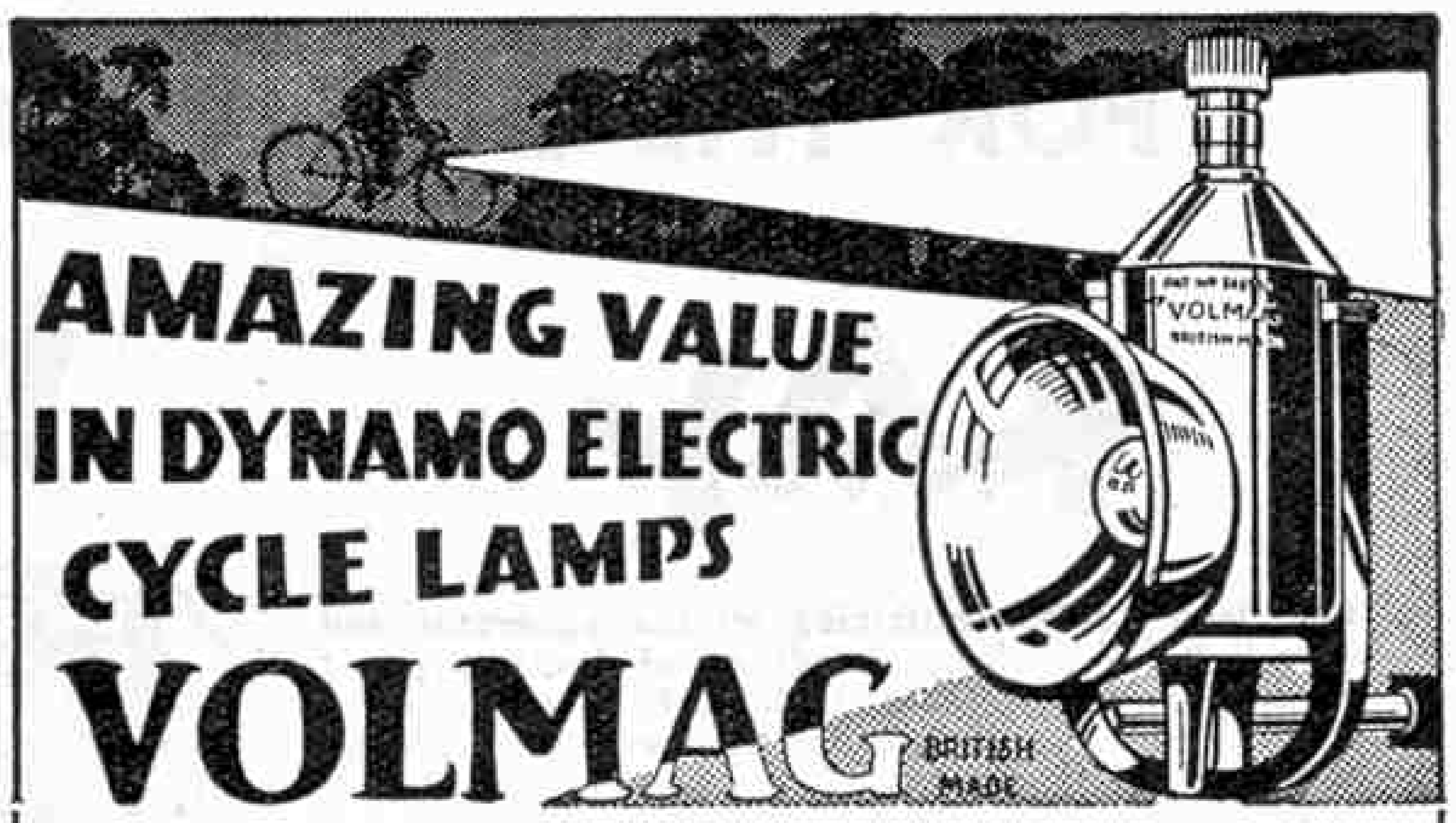

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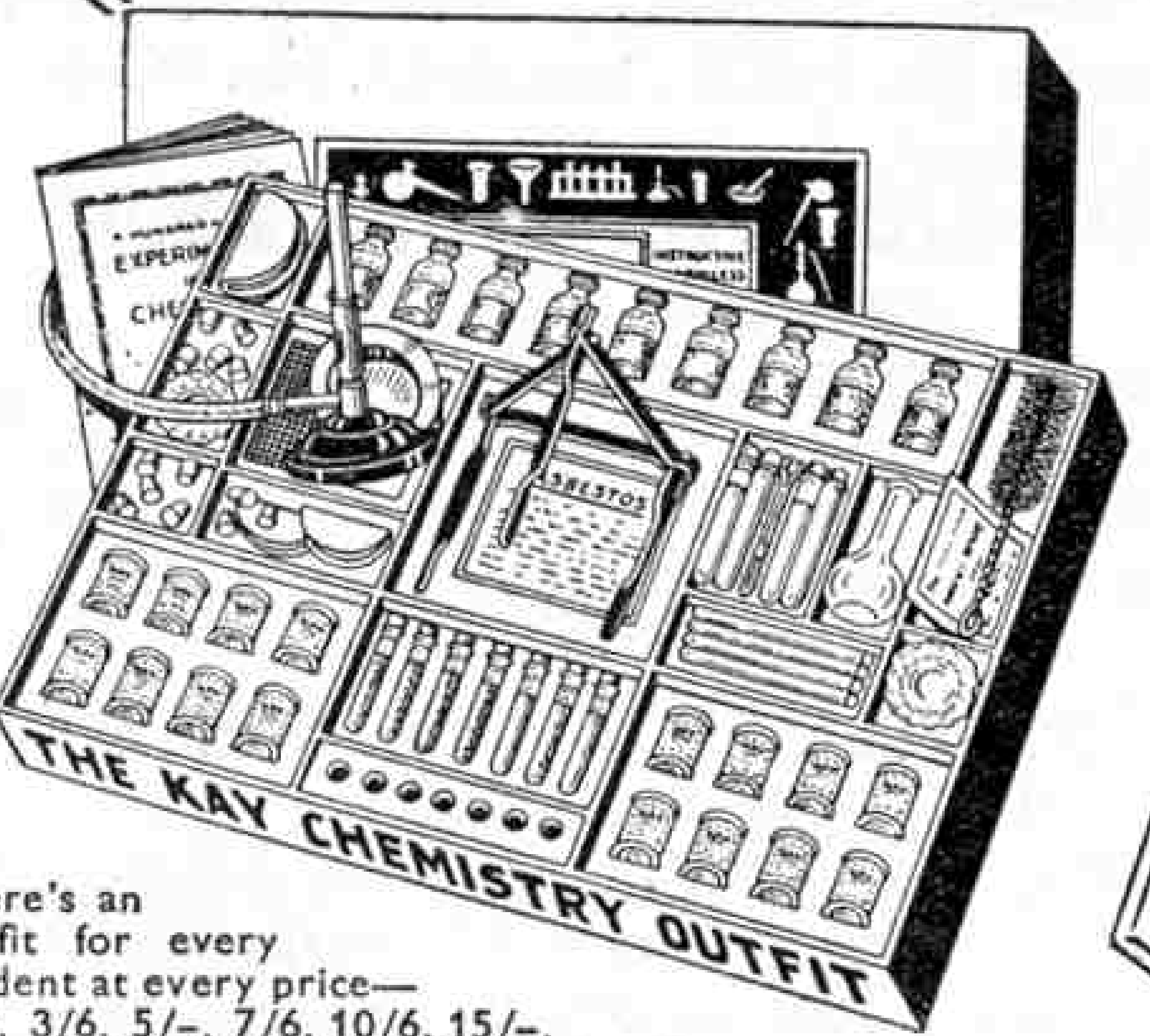

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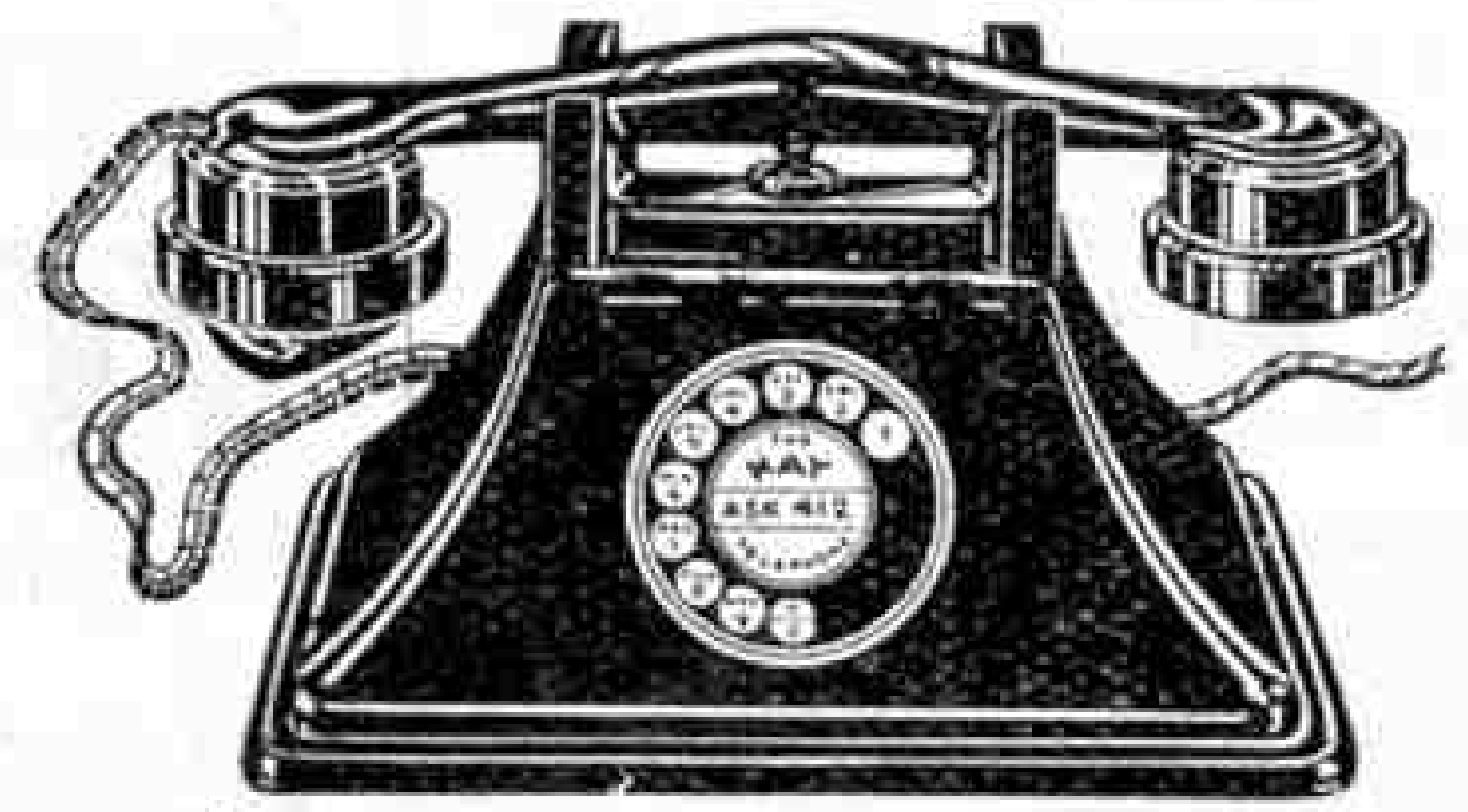

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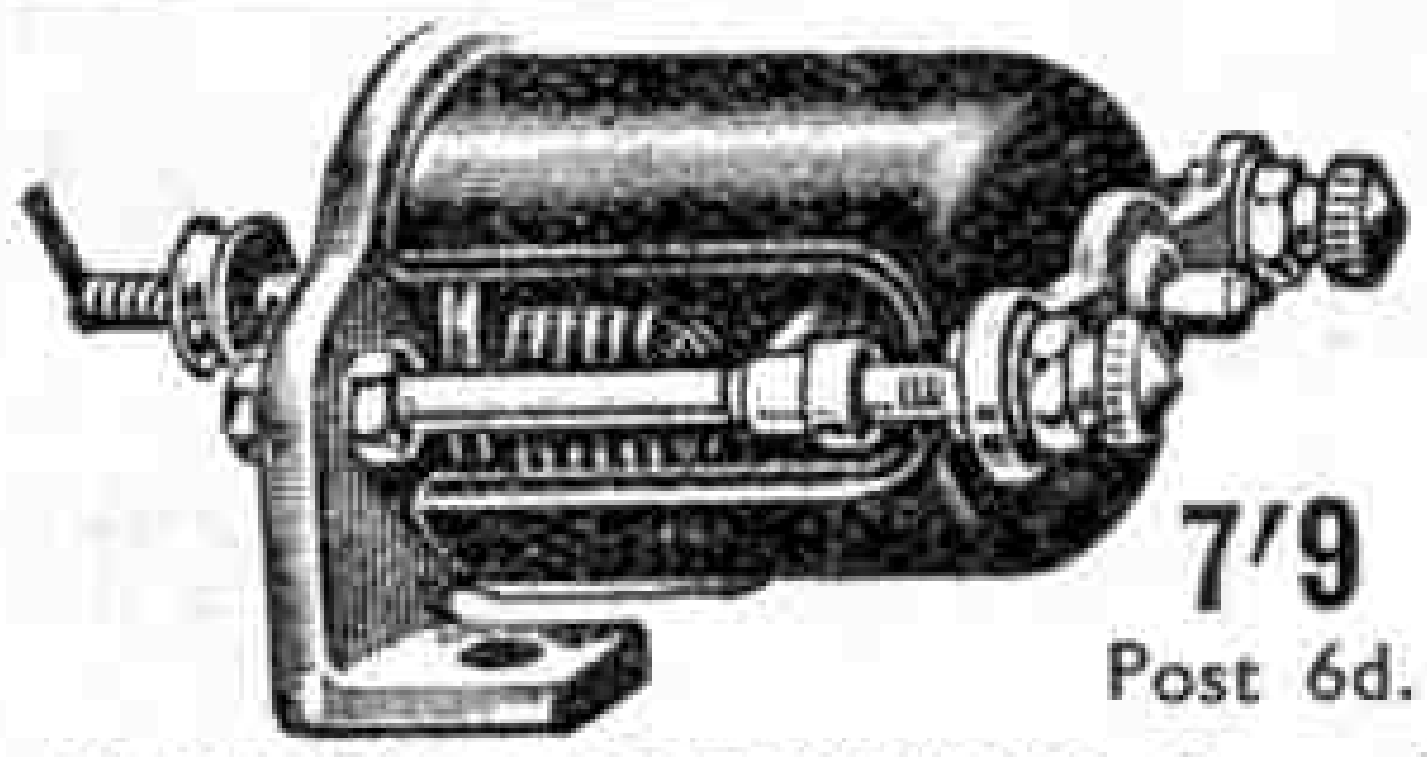

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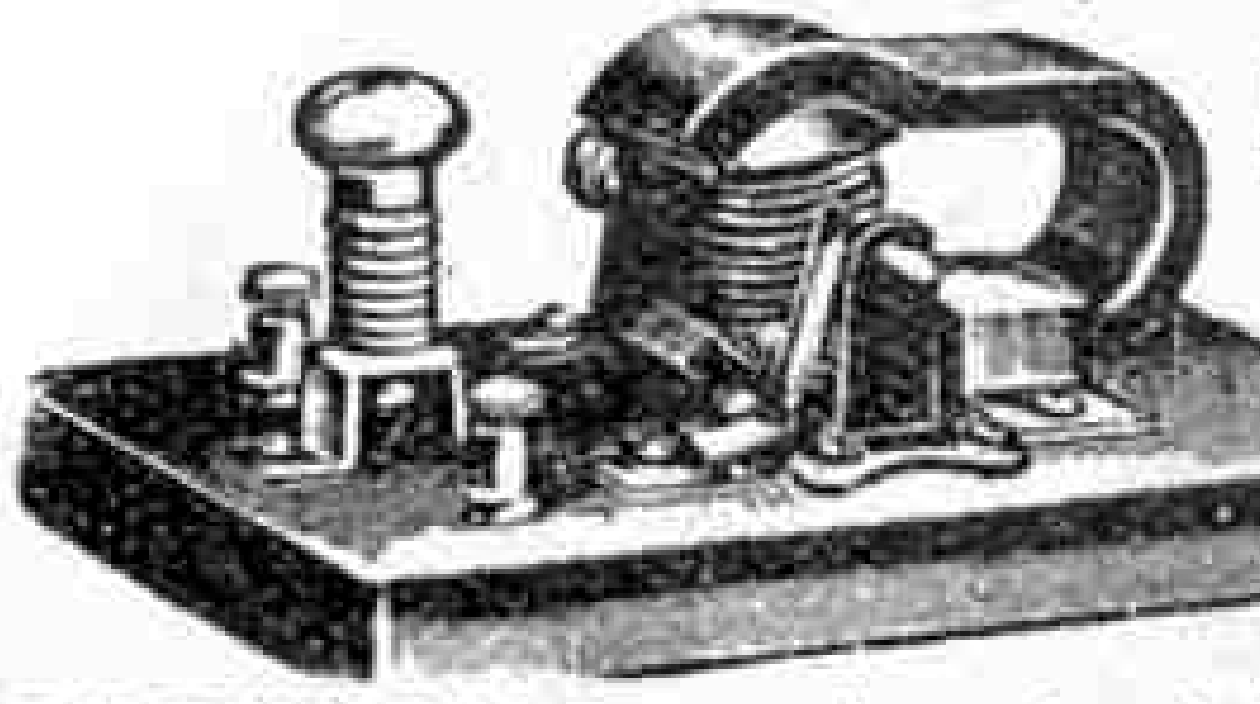

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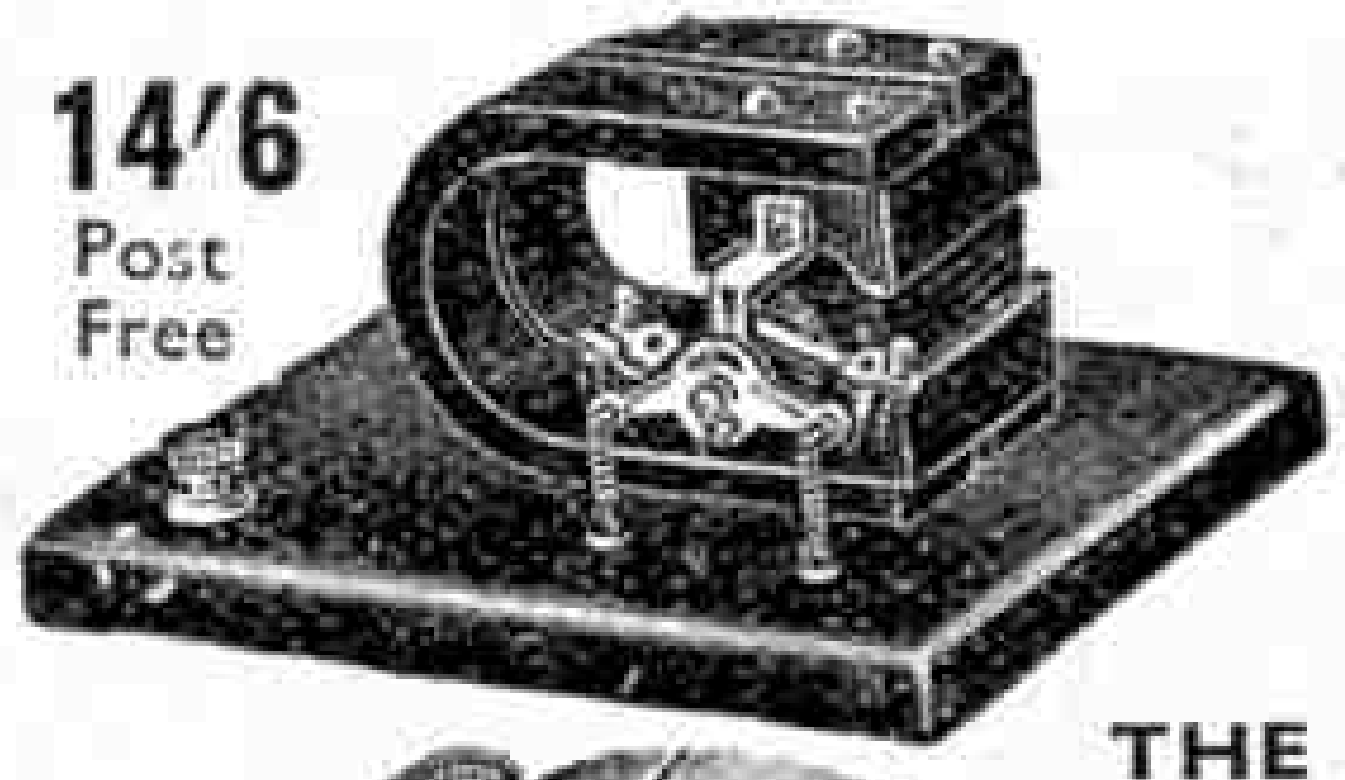
A "WILCO" DYNAMO excellent for lighting up models, etc., with a 3.5-volt bulb. Base 4¾ x 3 in. Wonderful value.



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"WILCO" SUPER DYNAMO. Strong twin magnets. Lights 6 lamps of 3.5-volt, .25 amp. Adjustable brushes. Generates D.C. current. Terminal contacts on hard wood base, 6½ x 4¼ in., **14/6**.

THE "WILCO" TRANSFORMER. With speed control, reduces 200/250 volts A.C. to 2-8 volts. Capacity 3 amperes. Ideal for driving our motors off the electric mains. Negligible working costs. Price **15/6**.

"WILCO" MAINS MOTORS. Features which have made these motors so popular include: Induction Motor; Bronze bearings; Constant lubrication; Silent and powerful; Does not interfere with radio. Supplied complete with lead and plug. For A.C. 200/220 or 230/250 volts. Rated at 1/40th h.p. **22/6** Cash or C.O.D.

NOTE: Geared Motors also supplied.

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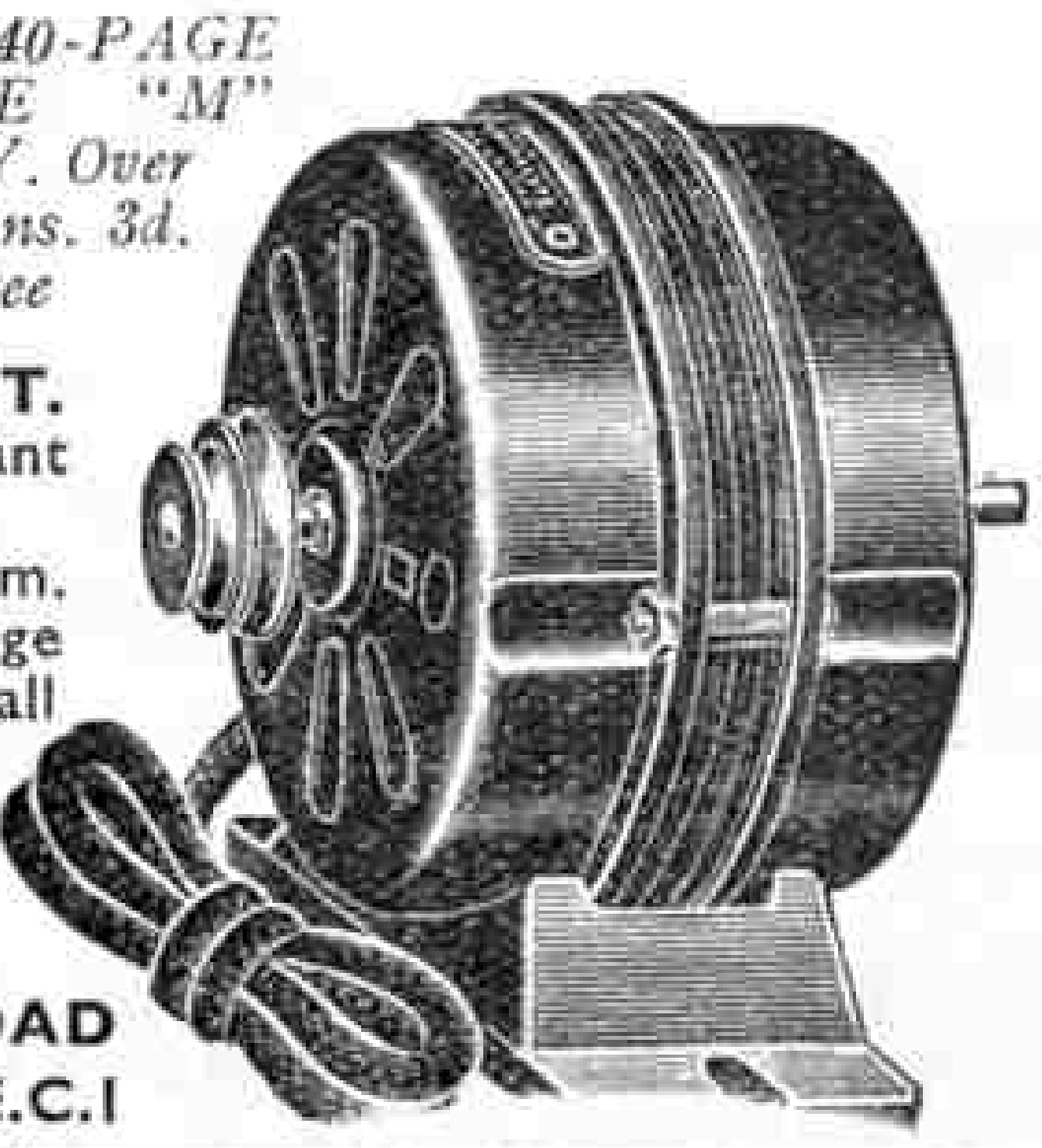

L. WILKINSON **8, CITY ROAD LONDON, E.C.1**

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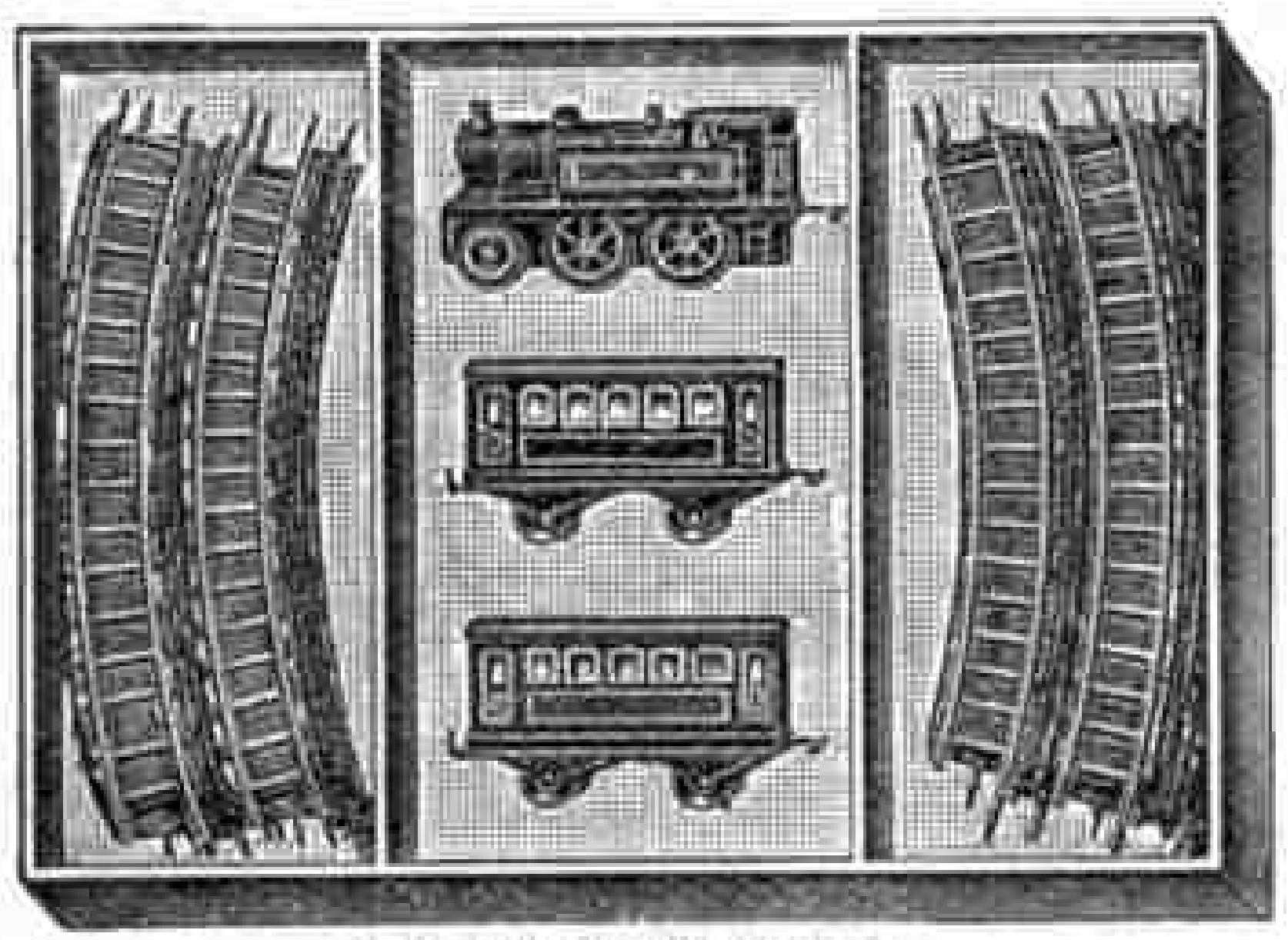
Start at once to build up a Miniature Railway which will go on the table top with ease.



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These sets are now available in the K.B. series, which have a still stronger clockwork mechanism fitted and are marvellous value for the money.

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No. 1 set, comprising bogie tank loco, fitted with brake, two carriages and circle of 12 rails. Price 8/–, postage 7d.

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No. 1 set, comprises bogie tank loco, which will work off a 6-volt battery or a 6-volt transformer, three carriages and a large oval track. Price 25/6, postage 8d.

SEPARATE PARTS

	Clockwork	Electric
Tank Locomotive, Red, Green	4/9	11/–
Passenger Coach, L.N.E.R., L.M.S.	8d.	8d.
Box Type Goods Van	8d.	8d.
Goods Wagon (Coal)	8d.	8d.
Signals	6d.	6d.
Telegraph Pole	3d.	3d.
Reverse Trip for Electric Locomotive	...	4d.
Level Crossing Gates	1/–	1/6
Railway Station with long platform	1/–	1/–
Halt Station	6d.	6d.
Siding Buffer Stop	6d.	6d.
Turntable	2/–	4/–
Signal Cable	6d.	6d.
Tunnel	6d.	6d.
Loco Shed, 4¼ in. long	1/–	2/–
Rails (straight), 7¼ in. long	6d. dozen	5d. each
Rails (curved), 12 to circle	2/– dozen	5d. each
Rails (half length, curved and straight)	1d.	3d.
Rails (quarter length, curved and straight)	1d.	3d.
Point Turnout to R.H. and L.H., 7½ in. long	1/9	4/6
Crossing (Scissor)	6d.	2/–
Rail with Regulating Resistance	...	4/6
Brake Rail for Clockwork Loco	4d.	...

Postage extra.

Send for Bond's 1935 Jubilee Catalogue, it contains 176 pages filled with all types of bargains in Model Railways, Ships and Aeroplanes, also all types of Tools and Materials. Price 6d. post free.

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Telephone: Museum 7137 **Established 1887**

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B.G.L. REAL MODEL FLOODLIGHTING SETS

The Electric Toy Sensation of the Year!

The B.G.L. Floodlighting Sets enable you to obtain brilliant colour effects on your Meccano models, toy forts, stations, dolls' houses, etc., just as Buckingham Palace and other famous buildings were illuminated during the Jubilee celebrations.

Each set contains perfect miniature floodlighting units with interchangeable coloured discs, together with switch, flex and all accessories for wiring up the floodlights. The B.G.L. Floodlighting Sets may be operated from an ordinary 4-volt flashlamp battery, accumulator or mains transformer.

SEE YOUR TOYS FLOODLIT IN COLOURS!

No. 1 Set. Contains 2 floodlights, switch, flex, etc. **3/6** each

No. 2 Set. Contains 3 floodlights with red, yellow and green discs and all accessories. **5/-** each

No. 3 De Luxe Set with 5 floodlights, spare discs and extra accessories. **7/6** each

The B.G.L. ELECTRICAL SETS

ALL EXPERIMENTS HARMLESS

These outfits contain sets of parts cleverly designed by means of which a series of absorbing and instructive electrical experiments can be carried out by anyone without any previous experience. The mysteries of the telephone, electric motor, dynamo, etc., are unfolded in a practical and fascinating manner by means of a copiously illustrated instruction booklet.

Prices:
2/6; 5/-, 7/6; 12/6, 18/6, 27/6, 42/-.

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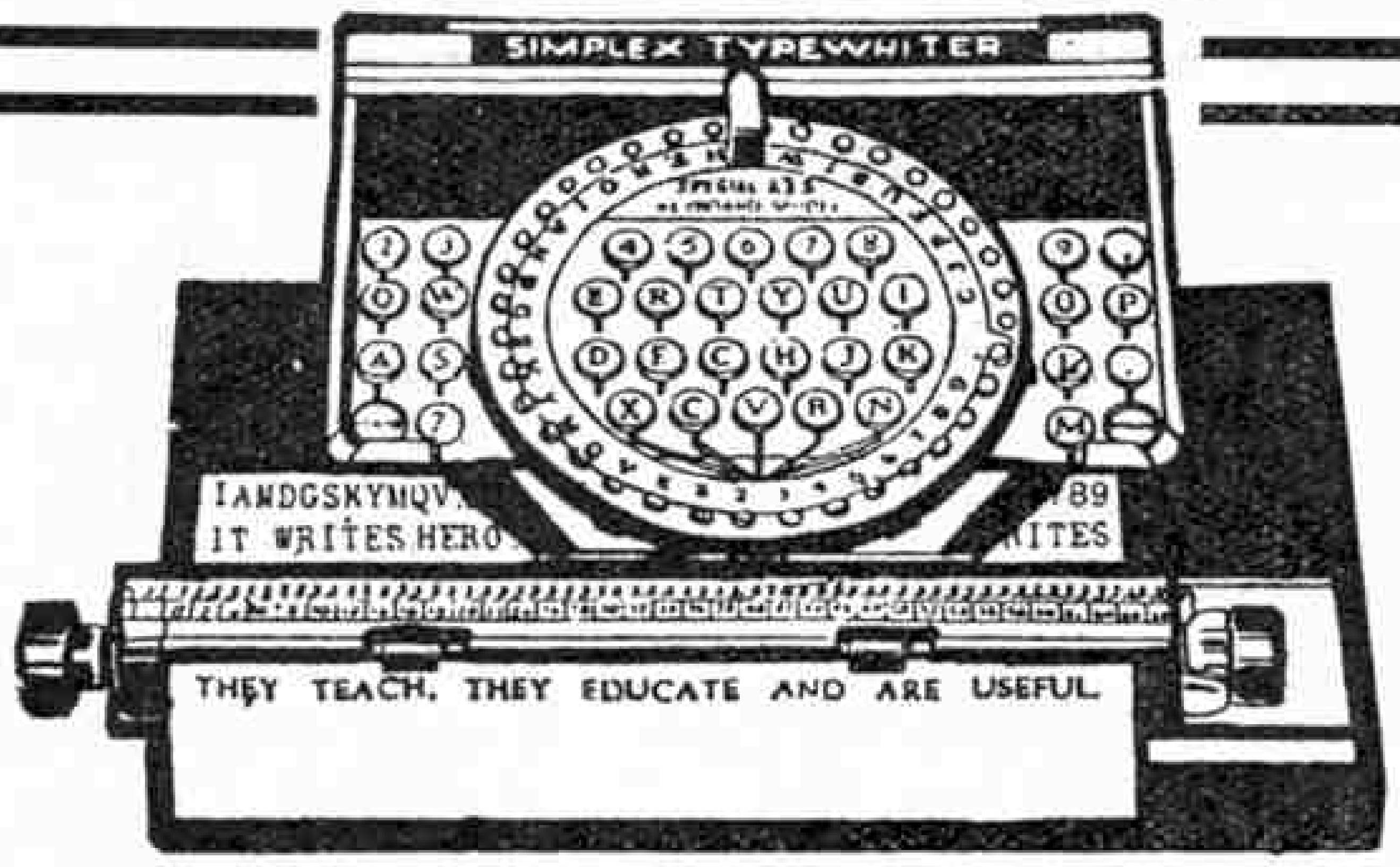

Specimen of Writing:

A B C D E F G H I J K L M N O
a b c d e f g h i j k l m n o
1 2 3 4 5 6 7 8 9 10 - . , ?

Every boy and girl has the ambition to type real letters, cards, programmes, etc. Over 200,000 machines already sold.

A Typewriter and complete printing outfit with Alphabet, Figures, and Stobs, etc.

No. A ... 6/6
No. D ... 20/-
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The New Keyboard Model shown above is the result of 25 years' improvement in miniature typewriter construction. Every machine guaranteed for 2 years. Of all dealers. Send for illustrated List to:

SIMPLEX TYPEWRITER CO.
WALTON HOUSE, 1, Newman Street, London, W.1

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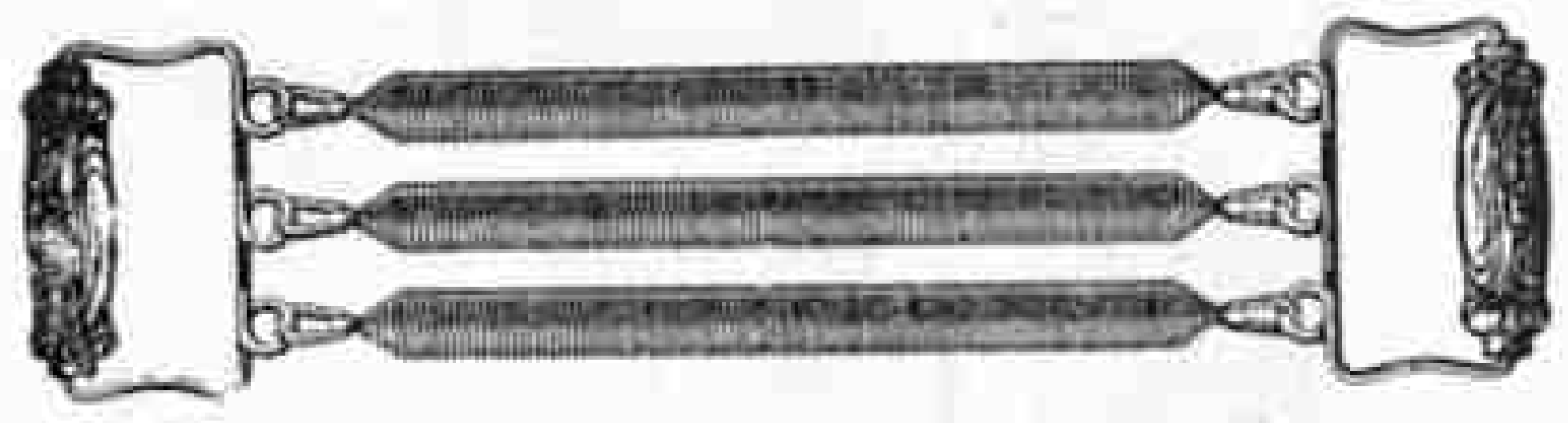
Train on a

TERRY CHEST EXPANDER

Develop Your Arms, Chest and Shoulders



Prices from 3/6

Ask your Sports Outfitter to show you a full range
or we will gladly send you a list

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The most interesting and most complete of all Aeroplane Modelling.

The latest constructional set, The HAWKER "HART," price **2/6**

The latest SKYBIRD Accessories:

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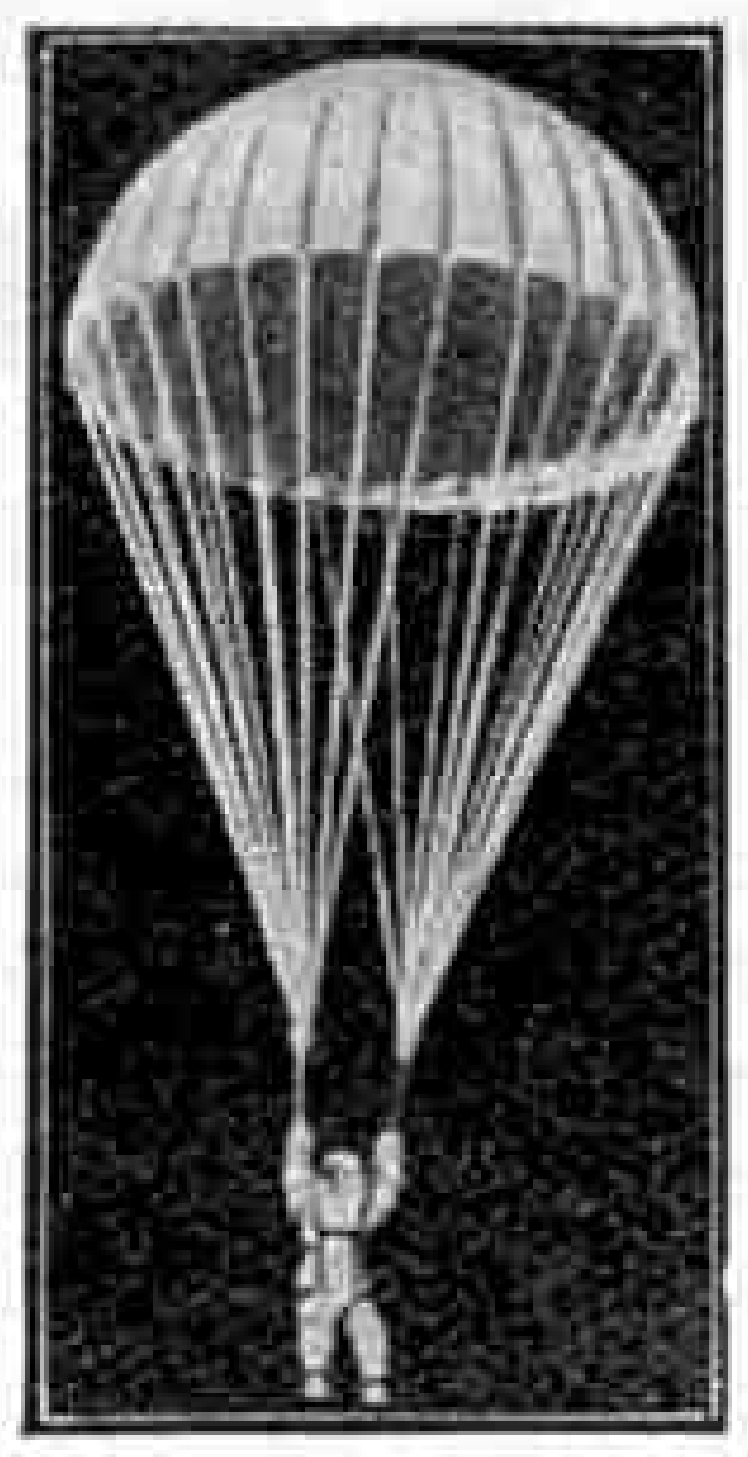

IRVIN AIR CHUTE, complete with parachutist ... **1/-** each.

A NEW SKYBIRD SET No. 9. Motor-Cycle Dispatch Rider, Machine Gun and Crew ... 5 piece set, **8d.**

No. 8 set of Airport Figures with Table and Chairs **1/6**

The above models are all to SKYBIRD scale 1/72nd and they are fully described in the October issue of THE SKYBIRD Magazine, Price **7d.** post free.

Join the army of SKYLEAGUERS—write for full particulars and illustrated list of models.

A NOVEL FEATURE (our latest casting)

Model Flying Boat "SHORT R.24/31"

Shipseries scale 100 feet equals 1 inch. Set of 4, price **1/-**.

This small model is fitted with a pin and can be worn as a Badge. The pin is also useful to raise the Flying Boat above the water.

SHIPSERIES

FOR NAUTICAL ENTHUSIASTS

Constructive Waterline Models of Famous Ships. Scale 100 feet equals 1 inch.

SHIPS OF THE ROYAL NAVY
Sets **1/6** to **3/-** each.

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Sets **4/6** to **5/-** each.

Our scale model Docks, Cliffs and Accessories lend great realism to these models. DOCKS, comprising **6** sections complete, Sheds, Wharves and Cranes, price **6/-**.

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Submarines, Flotilla of Six, **1/-**. Cross Channel Steamer "Canterbury," **6d.** Oil Tanker, **9d.** Tug Boat, **2d.** Lightship, **3d.**

Also write for illustrated list and address of nearest agent to:

A. J. HOLLADAY & CO. LTD. (Desk B)
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100 SUGGESTIONS

Here is a new and interesting booklet produced in answer to the popular demand of Hornby Railway enthusiasts. It contains a wide selection of attractive rail formations, varying from quite simple layouts to more ambitious designs with double track. The best possible uses of Hornby Rails, Points and Crossings are clearly demonstrated.

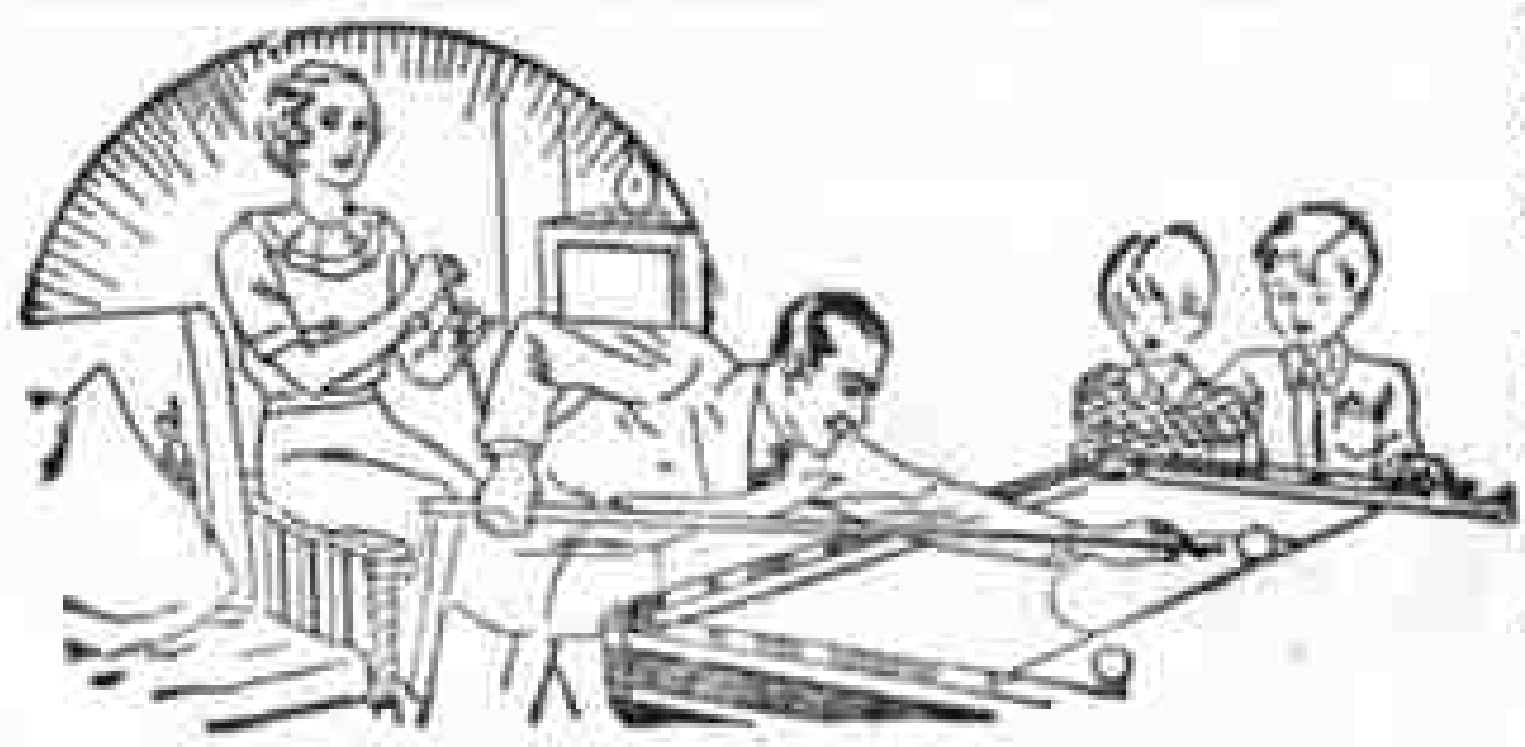
The booklet is obtainable (Price 3d.) from any Meccano dealer, or (Price 4d.) post free, direct from

MECCANO LIMITED
Binns Road, Liverpool 13

PRICE 3D.

HORNBY LAYOUTS

THE GREATEST HOME PASTIME!



8/- DOWN BRINGS IMMEDIATE DELIVERY OF A RILEY HOME BILLIARD TABLE THAT GIVES ENDLESS DIVERSION FOR ALL THE FAMILY.

Pay balance monthly as you enjoy the fascinations of Riley Billiards. There's no finer way of keeping the family together during the winter months than by having a Riley Billiard Table in the home.

7 Days Free Trial
Carriage paid. Transit risks taken by Rileys.

For true enjoyment, Billiards must be played on a REAL table, not a toy. All Riley "Home" Billiard Tables are perfect replicas of full-size tables. There are models to suit everybody and all sizes of rooms. Here they are:

		or in 20 monthly payments of
4 ft. 4 ins. × 2 ft. 4 ins.	£7 0 0	8/-
5 ft. 4 ins. × 2 ft. 10 ins.	£9 0 0	10/3
6 ft. 4 ins. × 3 ft. 4 ins.	£11 15 0	13/3
7 ft. 4 ins. × 3 ft. 10 ins.	£15 0 0	17/-
8 ft. 4 ins. × 4 ft. 4 ins.	£21 10 0	24/6

RILEY "COMBINE" DINING & BILLIARD TABLE

A real social asset to any home. A beautiful dining table and a flawless billiard table in one. Converts for either use in two minutes. Many styles, oak or mahogany. Cash or easy terms. Below are sizes and prices:

5 ft. 4 ins. × 2 ft. 10 ins	£22 10 0	or in 13
6 ft. 4 ins. × 3 ft. 4 ins.	£26 10 0	or 20
7 ft. 4 ins. × 3 ft. 10 ins.	£33 0 0	monthly
8 ft. 4 ins. × 4 ft. 4 ins. ...	£43 0 0	payments.

32 FREE Billiard Tables. Write for details and Price List.

Riley "Cabriole" design, 6 ft. size, **£34 10 0,** or monthly terms.

Rileys are the largest makers of full-size tables in Gt. Britain. Also specialists in re-covering, re-modelling, billiard sundries, etc.

E. J. RILEY LTD., Deal Works, Accrington,
and Dept. 3, 147, Aldersgate Street, London, E.C.1.

RILEY HOME BILLIARDS

BOYS enjoy your Winter evenings!!!

No. 3

INDCOL MICROSCOPES

for all purposes

	Each
Model 1	**2/6**
,, 2	**3/6**
,, 3	**7/6**

IN COLLECTION SETS:

	Each
Model 1	**3/9**
,, 2	**6/9**
,, 3	**10/6**

MAKE SURE OF THE MARK **INDCOL**

Obtainable at all Stores, or post free direct from

L. CONOLEY
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TOYS OF QUALITY MADE BY MECCANO LTD

KEMEX
CHEMICAL OUTFITS

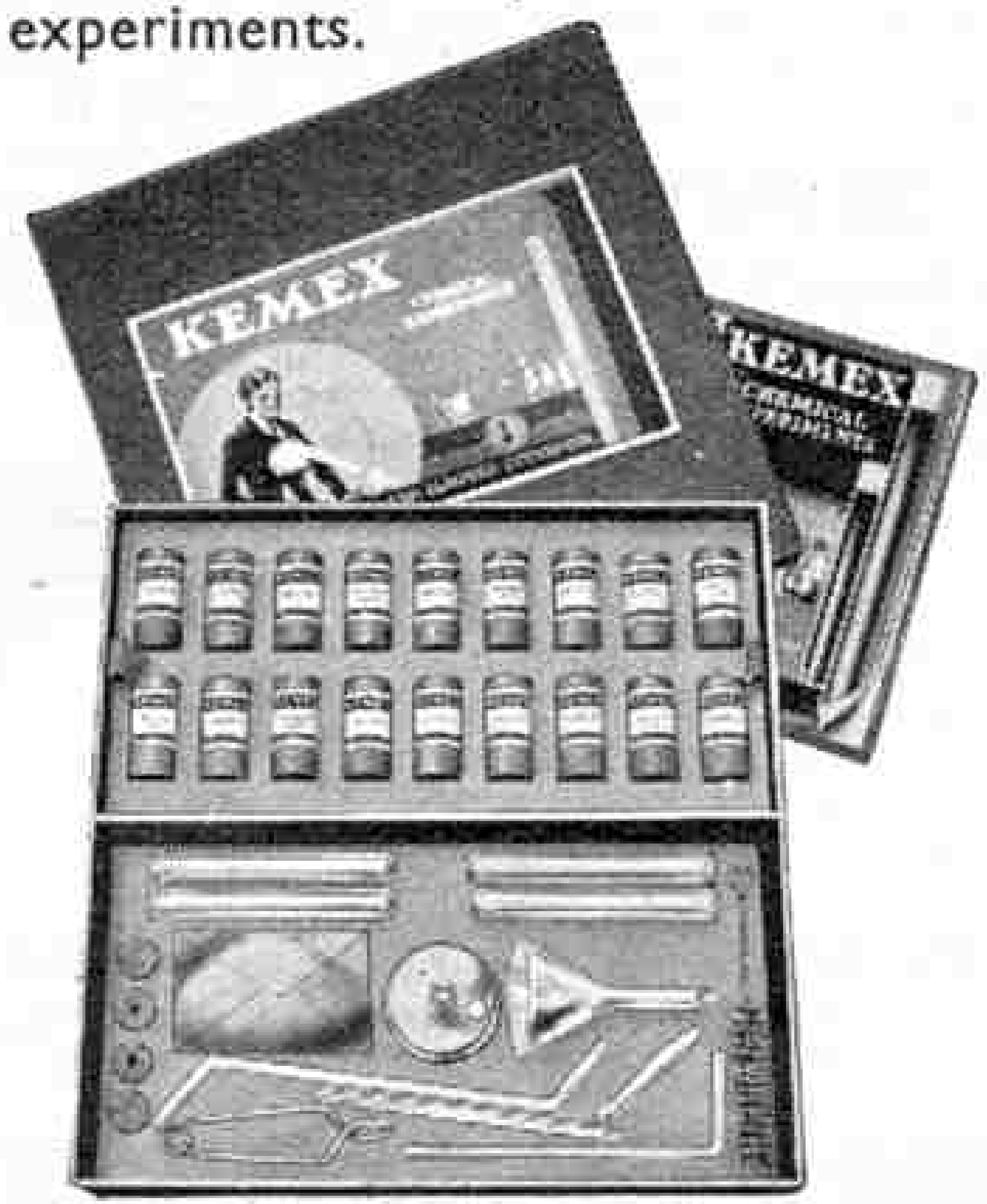
The contents of the Kemex Chemical Outfits will provide many hours of fascinating fun. With the apparatus and materials contained in them a boy can make inks and soaps; dye wool, cotton and silk, and bleach fabrics that are already dyed; test foodstuffs for impurities; analyse air and water; grow crystals; make invisible inks and a chemical garden, and perform a host of other interesting chemical experiments.

No. O Kemex Outfit
75 Experiments

This Outfit includes a supply of specially selected chemicals, packed in airtight containers, together with a length of Magnesium Ribbon, sufficient to perform 75 attractive and varied experiments. A simple and highly efficient Spirit Lamp is included that makes the Outfit completely self-contained. Price 5/-

No. I Kemex Outfit
130 Experiments

This Outfit includes the whole of the contents of the No. O Outfit, together with further chemicals and apparatus that increase the number of experiments that can be performed to 130. Price 7/6



No. 1 Kemex Outfit

No. 2L Kemex Outfit
250 Experiments

This Outfit includes the contents of the No. 1 Outfit, and further chemicals and apparatus that increase the range of experiments up to 250. Price 15/-

No. 2B Kemex Outfit

This is exactly the same as the No. 2L Meccano Kemex Outfit, except that a highly efficient Bunsen Burner, with the necessary length of rubber tubing, is included in place of the Spirit Lamp. Price 15/-

No. 3L Kemex Outfit
350-400 Experiments

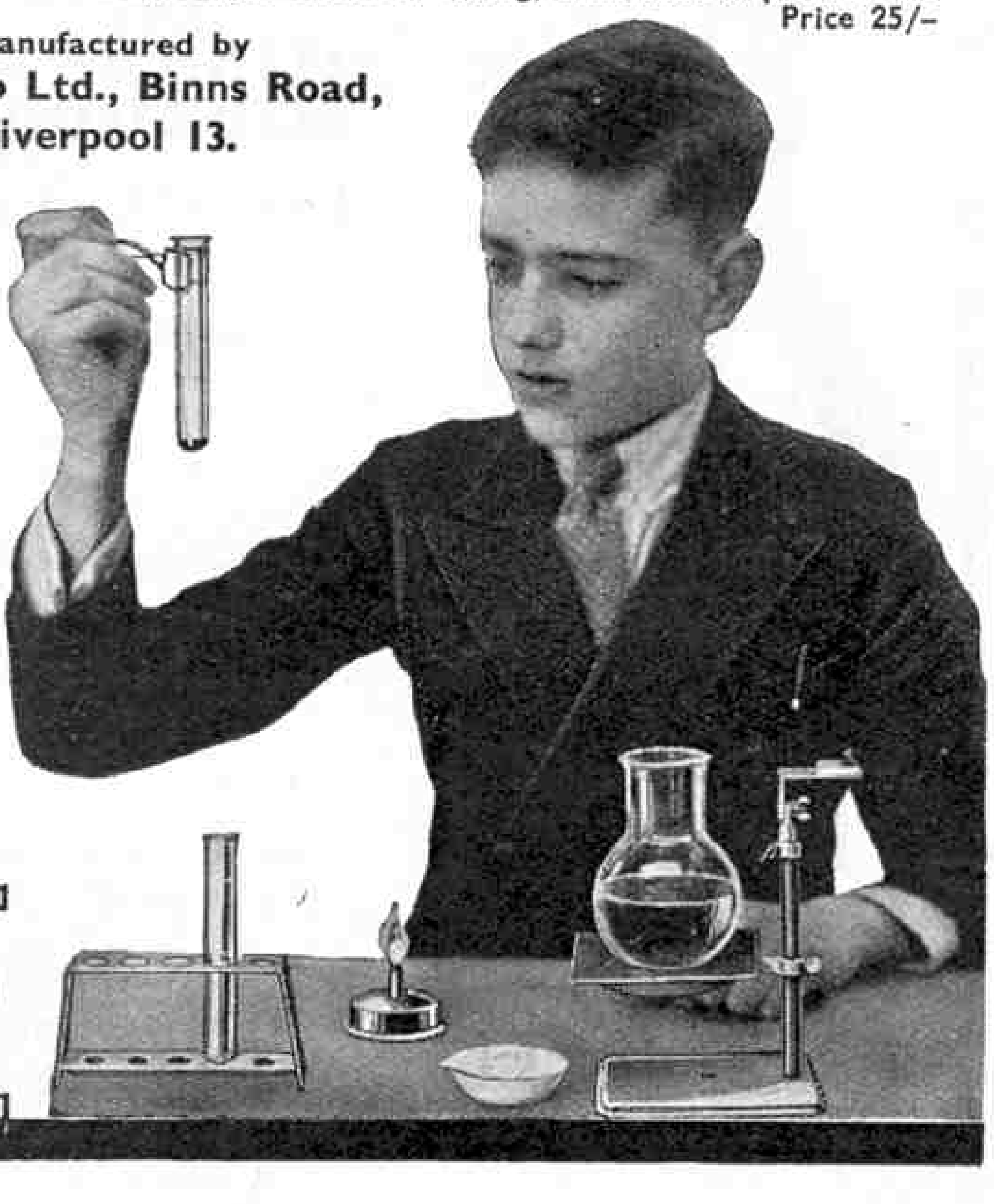
This splendid Outfit enables a boy to carry out between 350 and 400 experiments. It includes the contents of the No. 2 Outfit, with additional chemicals and apparatus including a gas-generating apparatus, consisting of a large Wide-necked Flask with Thistle Funnel and Delivery Tubes, and a Blowpipe and a Charcoal Block. Price 25/-

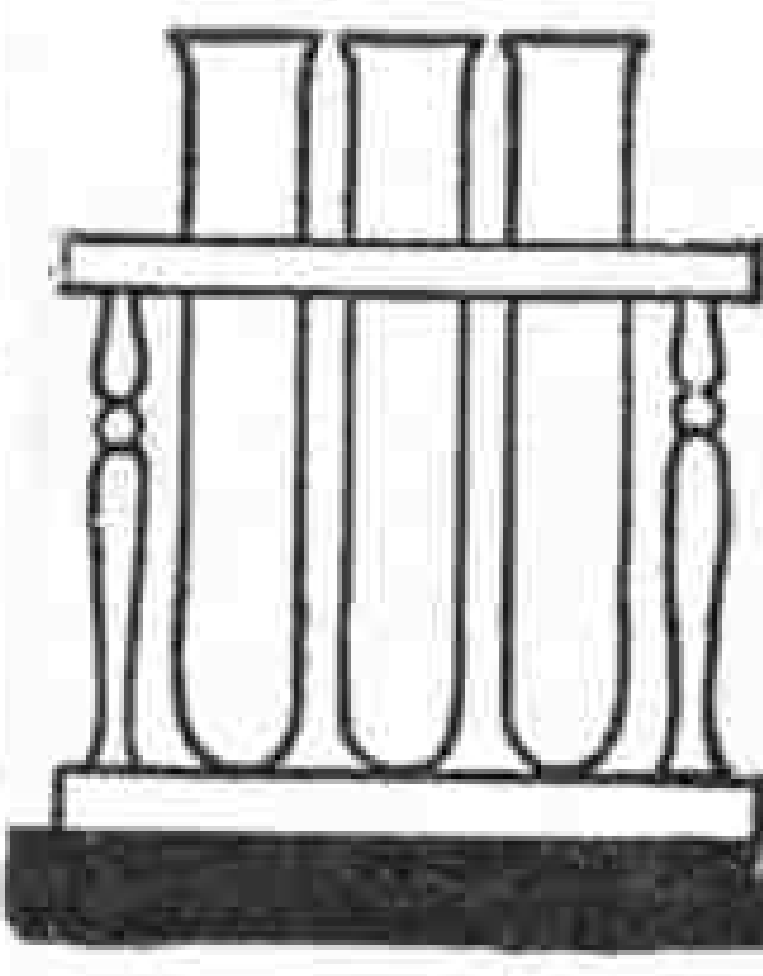
No. 3B Kemex Outfit

This is the same as the No. 3L Meccano Kemex Outfit, except that a Bunsen Burner, with the necessary length of rubber tubing, is included in place of the Spirit Lamp. Price 25/-

Manufactured by
Meccano Ltd., Binns Road,
Liverpool 13.

The apparatus included in Kemex Outfits and refills of Kemex chemicals can be obtained separately. Ask your dealer for the leaflet giving a list of Kemex parts and their prices, or write for a copy to the address given above.



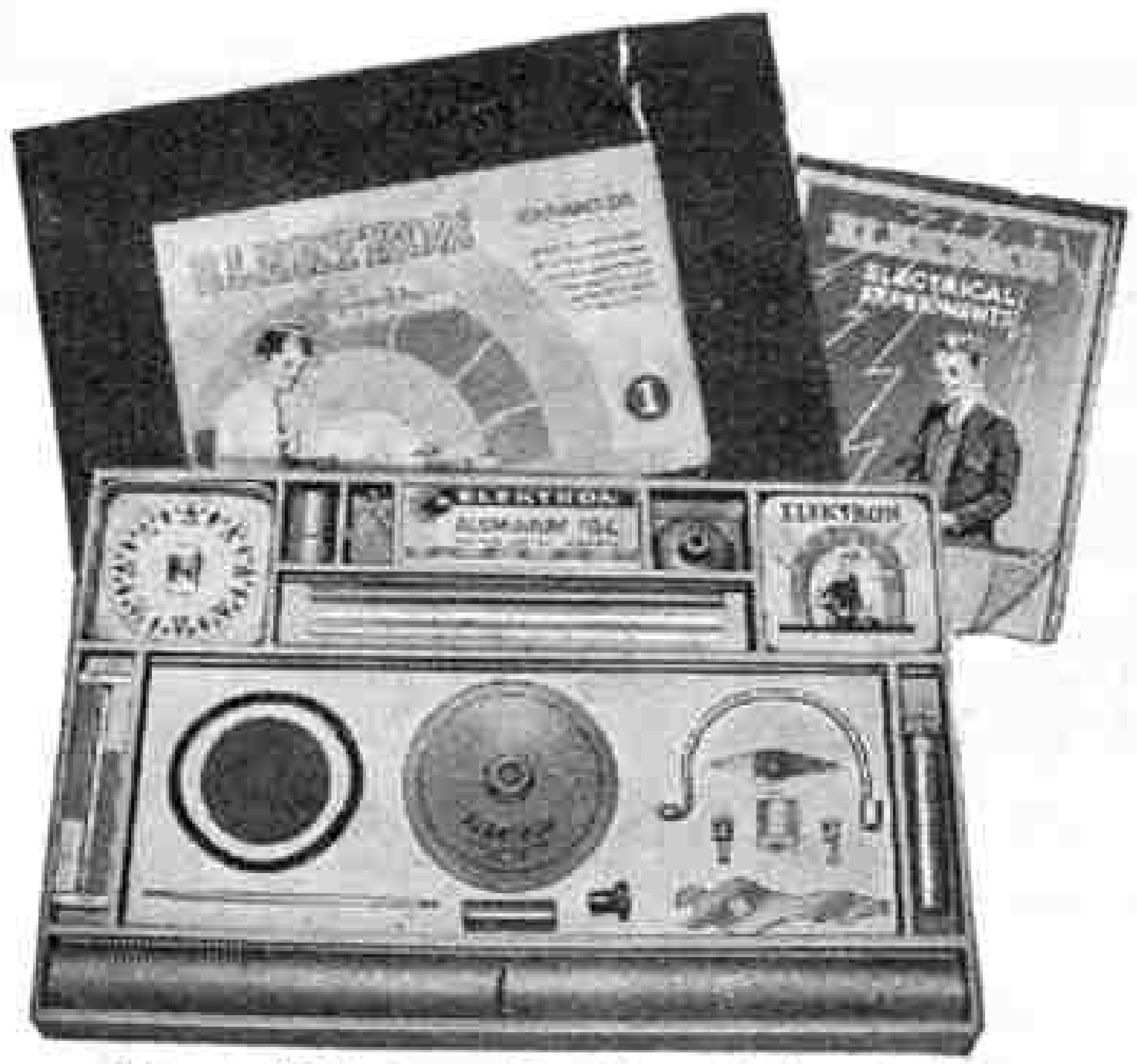


ELEKTRON
ELECTRICAL OUTFITS

In these days of radio, X-rays and electric trams and trains every boy should have a knowledge of electricity. The only way to gain this knowledge is by means of experiments, and the Elektron Outfits have been produced specially for this purpose. They provide the necessary material for carrying out a series of fascinating experiments in magnetism, frictional electricity and current electricity.

The No. 2 Outfit has the added attraction this year of a considerable price reduction.

In the above illustration is shown an electric bell being made with the contents of Elektron Outfit No. 2.



No. 1 Elektron Outfit Price 6/6

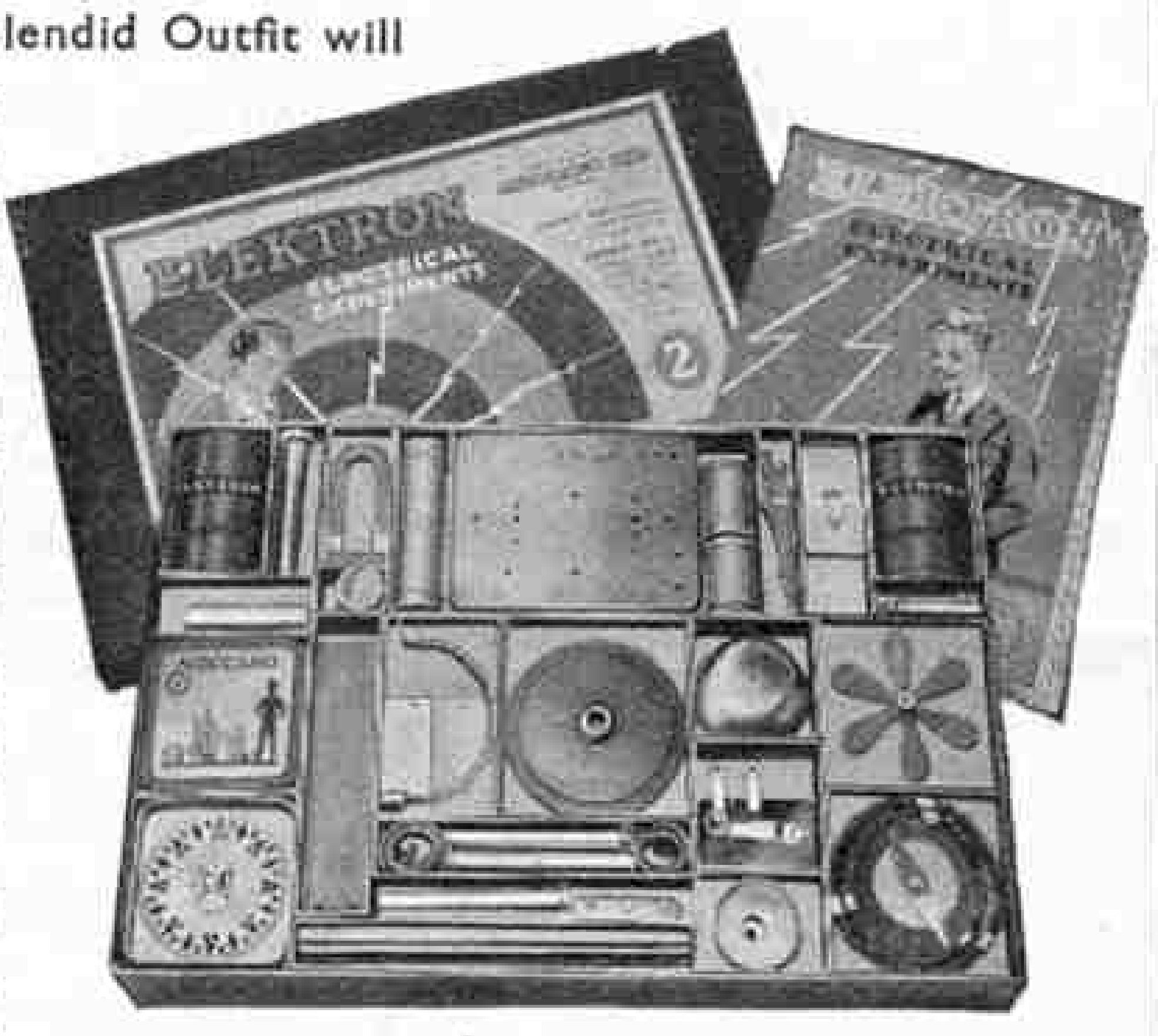
No. I Elektron Outfit
Magnetism and Static Electricity

The No. 1 Outfit contains two powerful Bar Magnets, a Horseshoe Magnet, and a reliable Magnetic Compass, together with everything necessary for the carrying out of a series of fascinating magnetic experiments. In addition there are materials for experiments in frictional or static electricity, and for the construction of an Electric Compass, two forms of Electroscope, and an Electrophorus. Price 6/6

No. 2 Elektron Outfit
Current Electricity

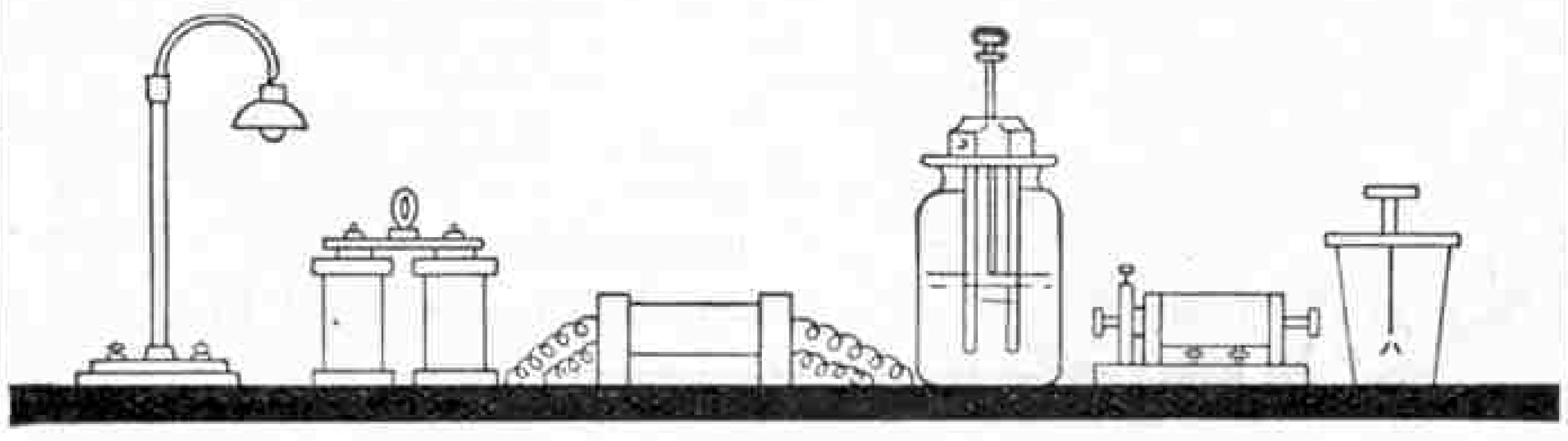
The reduced price of this splendid Outfit will make it more popular than ever. Everything that is necessary for a series of experiments with electric currents is included in the Outfit. It contains the parts required to make a Bichromate Cell, and to build a wide range of electrical devices, including Electro-Magnets, an Electric Bell, and a Buzzer for use in an electric telegraph system. A Shocking Coil that will give hours of fun, and two types of working Electric Motors also can be constructed from the contents of this Outfit. Price 17/6

The parts contained in the Elektron Outfits can be obtained separately. Ask your dealer for the Elektron Folder giving a list of Elektron parts, or write for a copy to the address below.



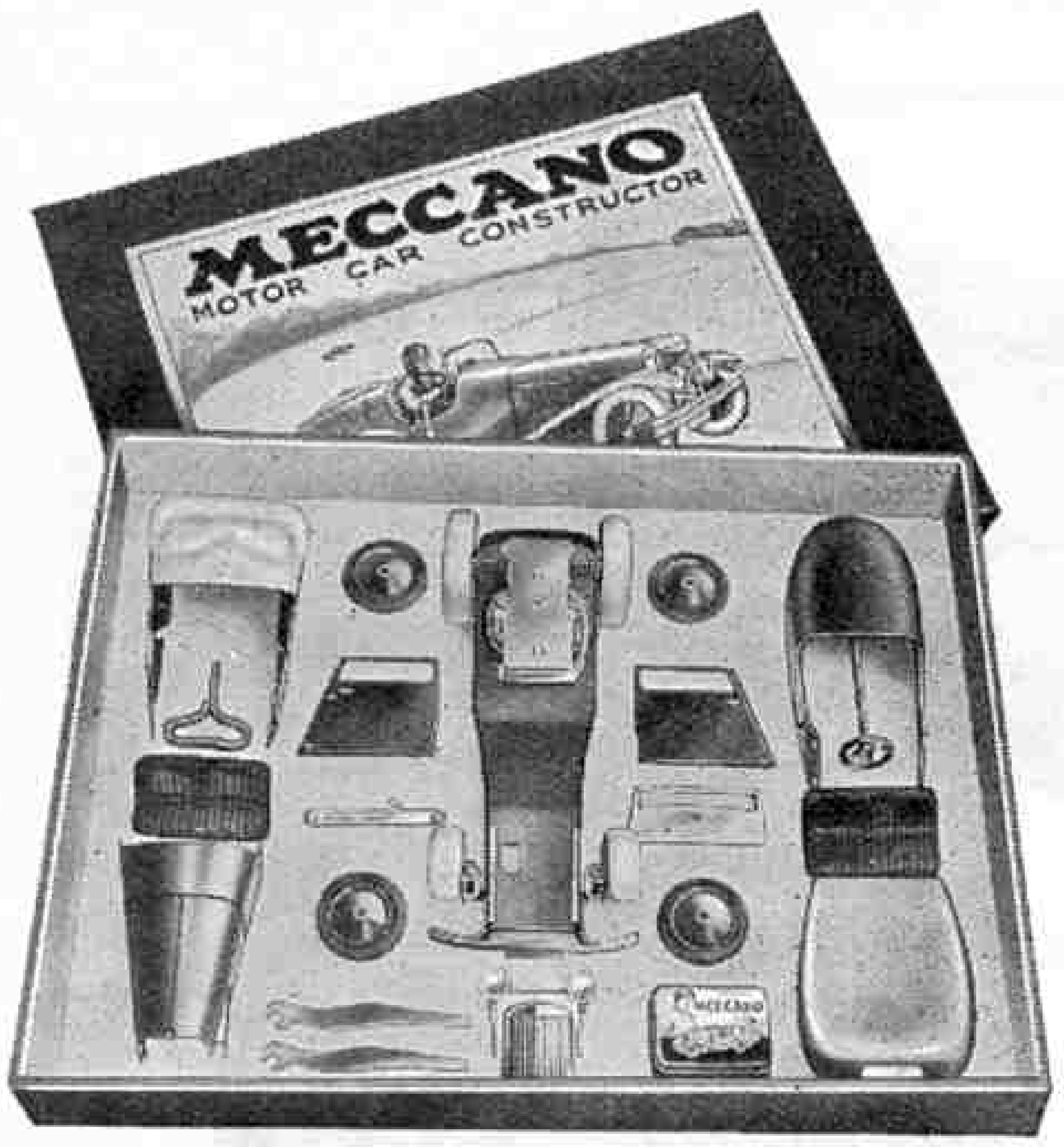
No. 2 Elektron Outfit Price 17/6

Manufactured by
MECCANO LTD., Binns Road, LIVERPOOL 13

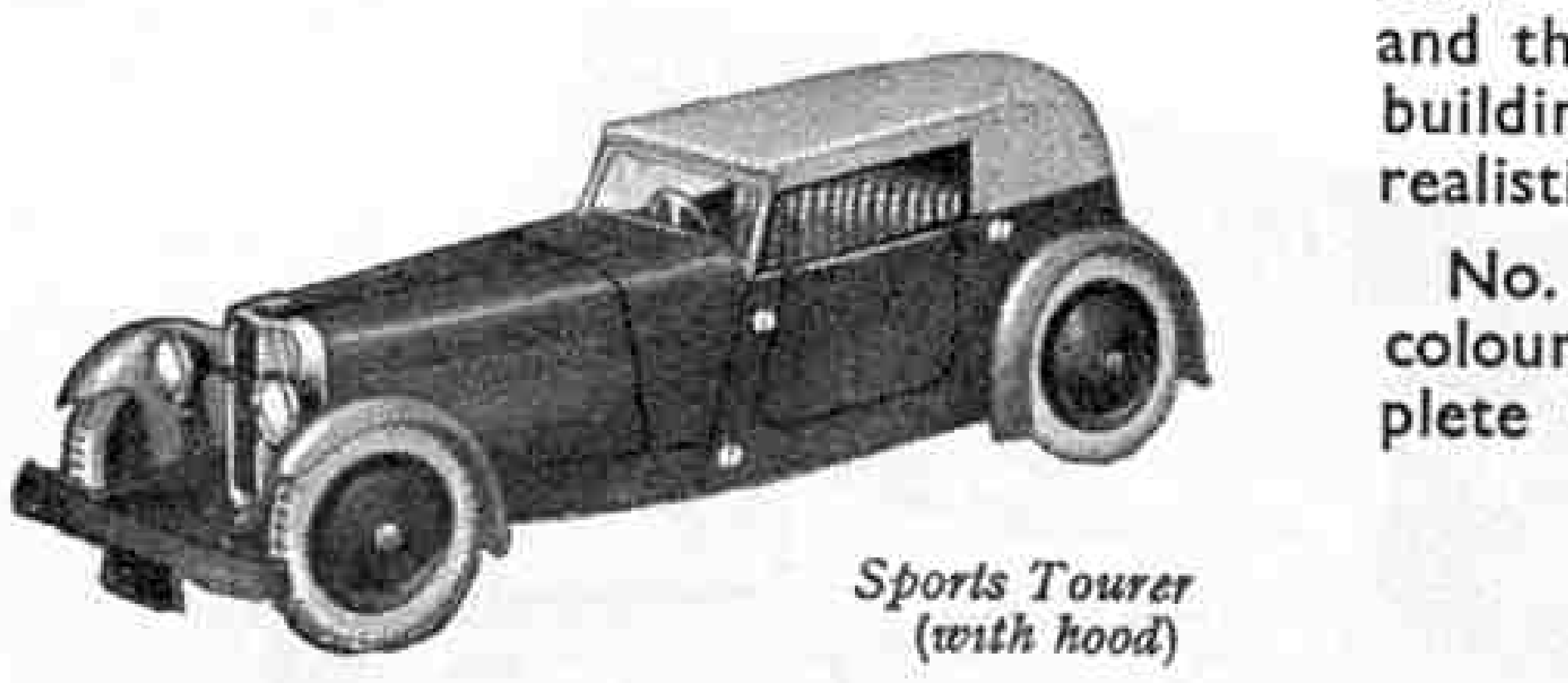


ANOTHER OF **MECCANO LTD'S** FAMOUS TOYS

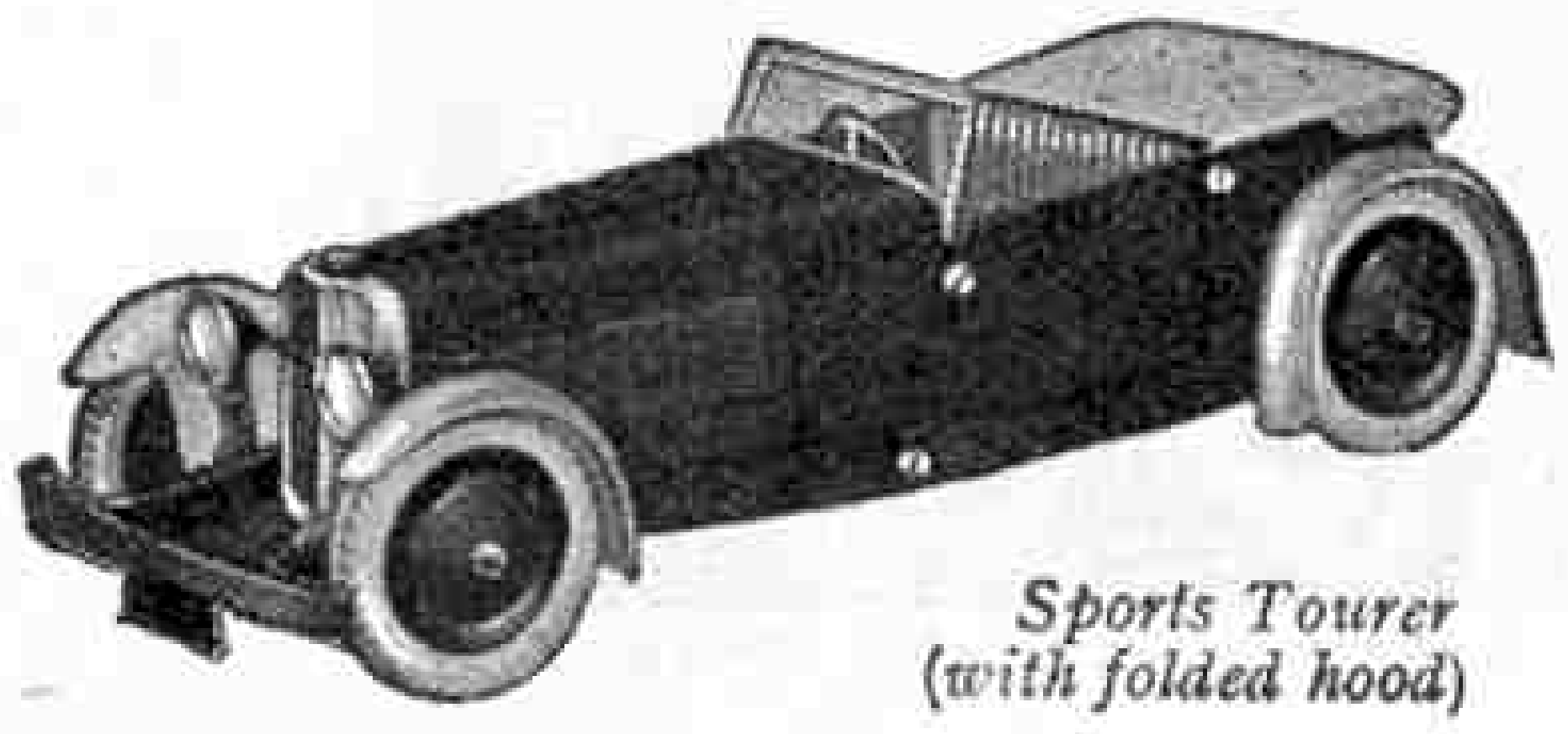
MOTOR CAR CONSTRUCTOR OUTFITS



No. 1 Meccano Motor Car Outfit



Sports Tourer (with hood)



Sports Tourer (with folded hood)

You will be keen to have one!

Boys, as soon as you see these fine Motor Car Constructor Outfits you will be keen to have one. The models they build are superb. Sports four-seaters, coupés, speed cars and other perfect miniature reproductions, each one a beautiful model of its prototype. All the models are driven by means of a powerful Clockwork Motor (included in the Outfit), giving a long, speedy and realistic run on each winding.

The motor car parts are finished in rich enamel, nickel-plate and chromium, the complete Outfits being masterpieces of miniature automobile craftsmanship.

No. 1 Motor Car Constructor Outfit

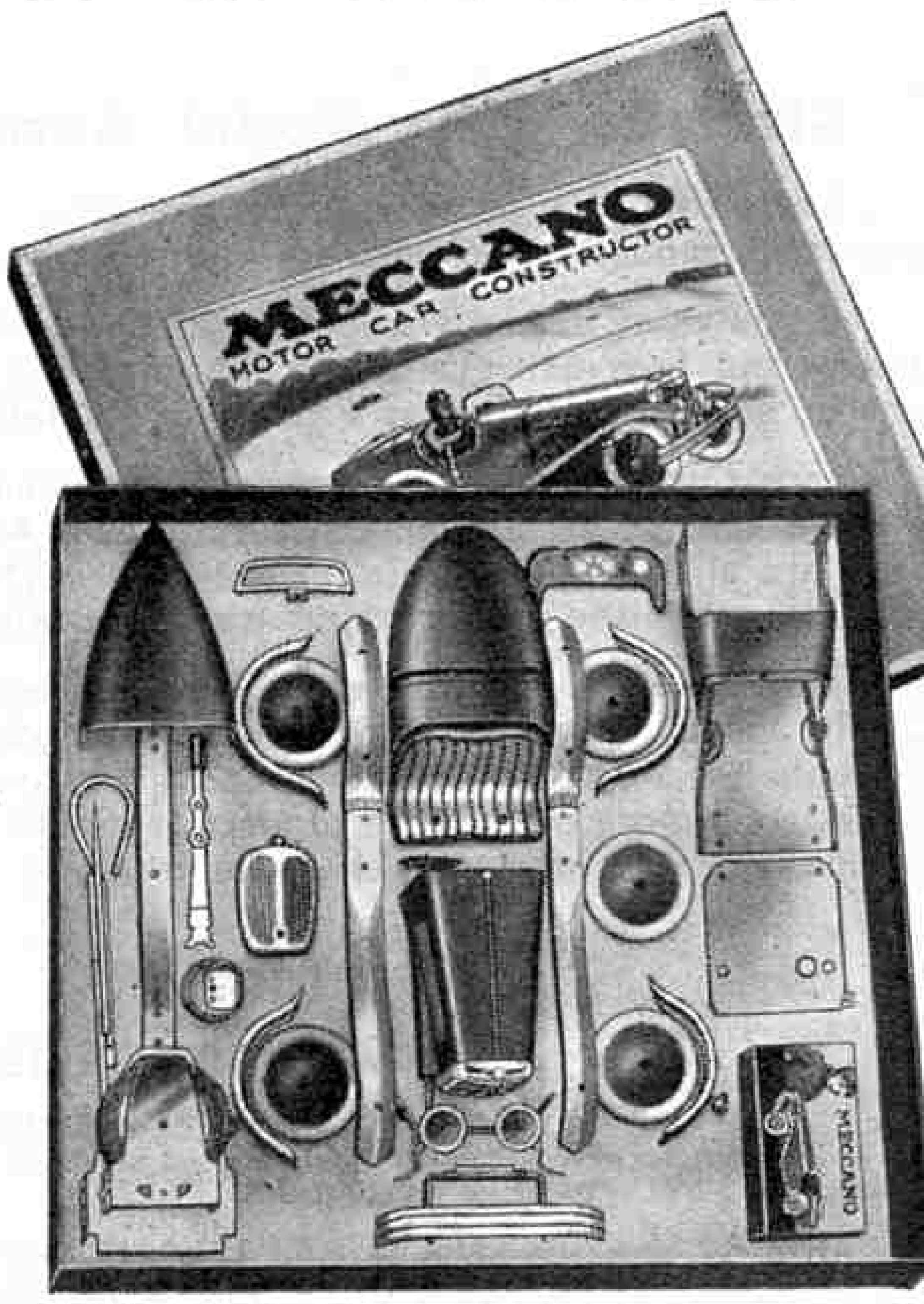
The motor car models that can be built with this Outfit are the finest you ever saw. Look at the examples illustrated and think of the fine fun you could have building these and other types equally realistic.

No. 1 Outfit is available in four different colour combinations and is supplied complete with powerful Clockwork Motor.
Reduced Price **10/-**

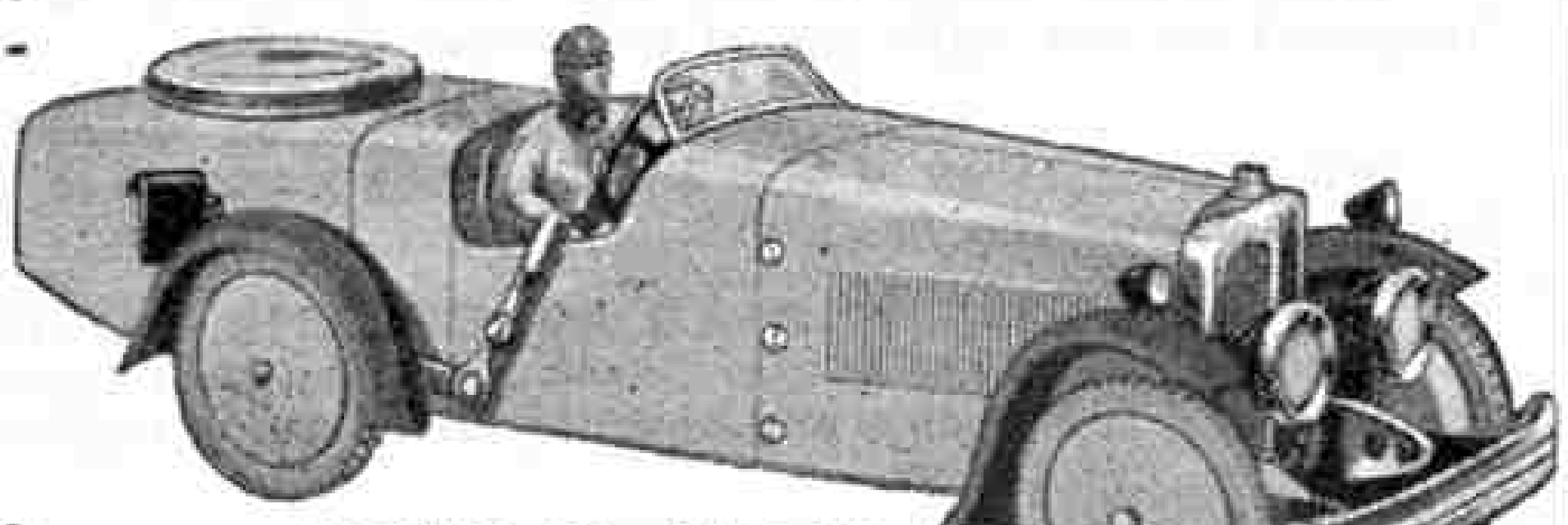
No. 2 Motor Car Constructor Outfit

Larger models of a superior type can be built with No. 2 Outfit. Their handsome and realistic appearance may be judged from the accompanying illustrations.

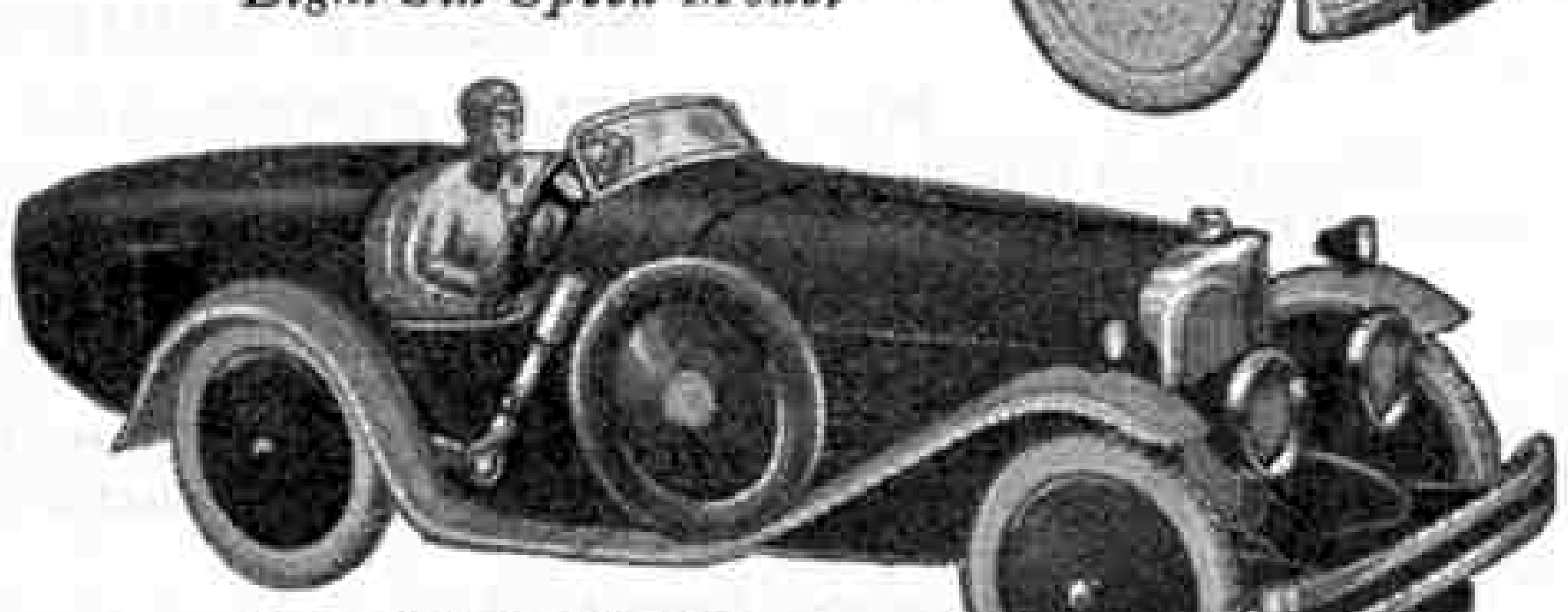
No. 2 Outfit is available in four different colour combinations, and a powerful Clockwork Motor that gives a run of 105 feet on one winding is included.
Reduced Price **20/-**



No. 2 Meccano Motor Car Outfit



Light Six Speed Model



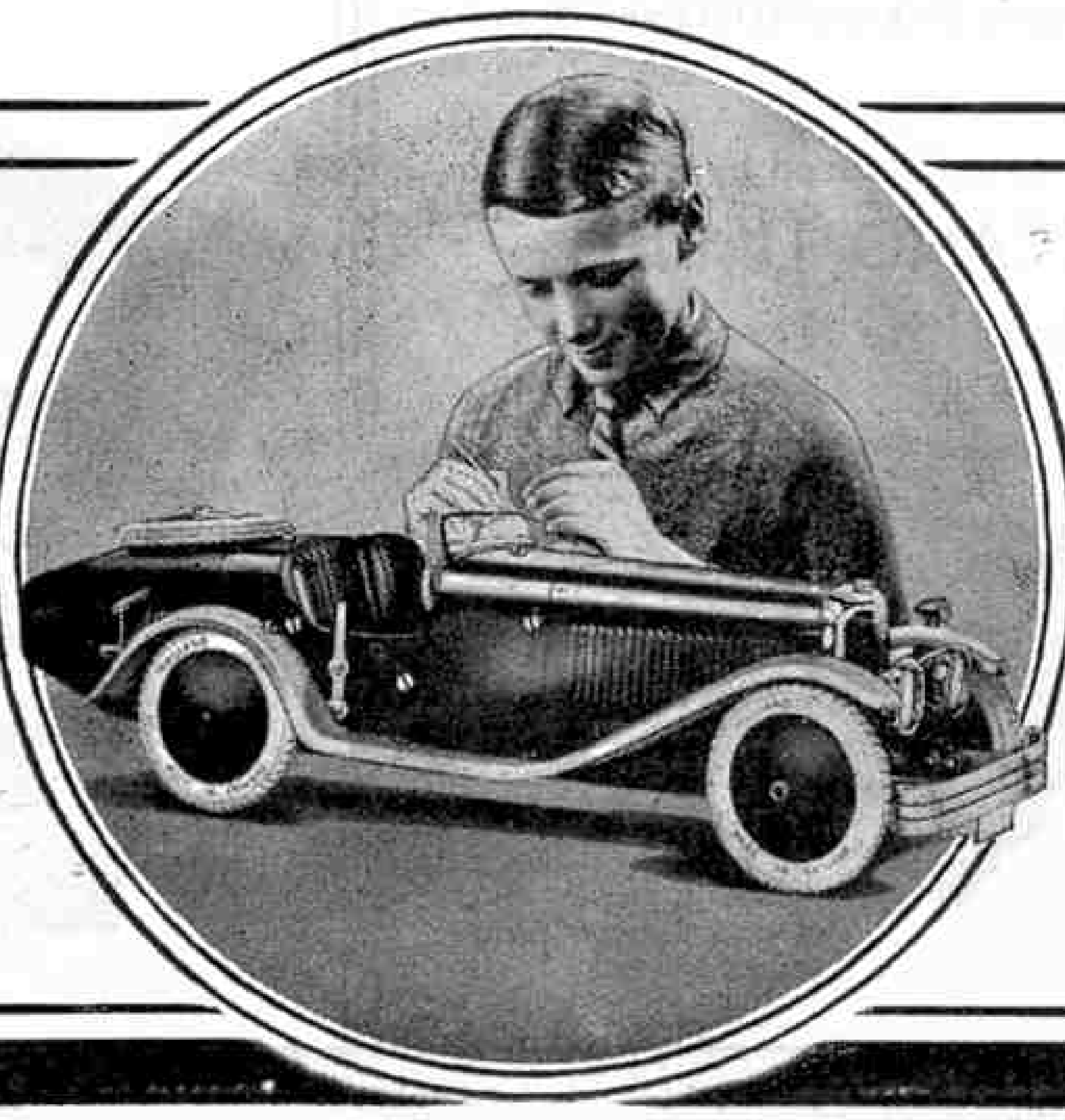
Grand Prix Special

Choice Range of Colours

If extra parts in any of the standard colours are required they can be purchased from any Meccano dealer. In addition to the four standard colour combinations, the following parts are available in the colours indicated:

Body Sections: orange, yellow. Wheels: orange, yellow. Wings: orange, green.

IMPORTANT.—It should be noted that the No. 1 Motor Car Outfit parts cannot be used in conjunction with those of the No. 2 Outfit.



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This realistic Motor Car Garage provides accommodation for any Meccano model motor car or other cars of suitable size. Inside dimensions: Height 5 in., Length 13 in., Width 7¾ in. Price **5/6**

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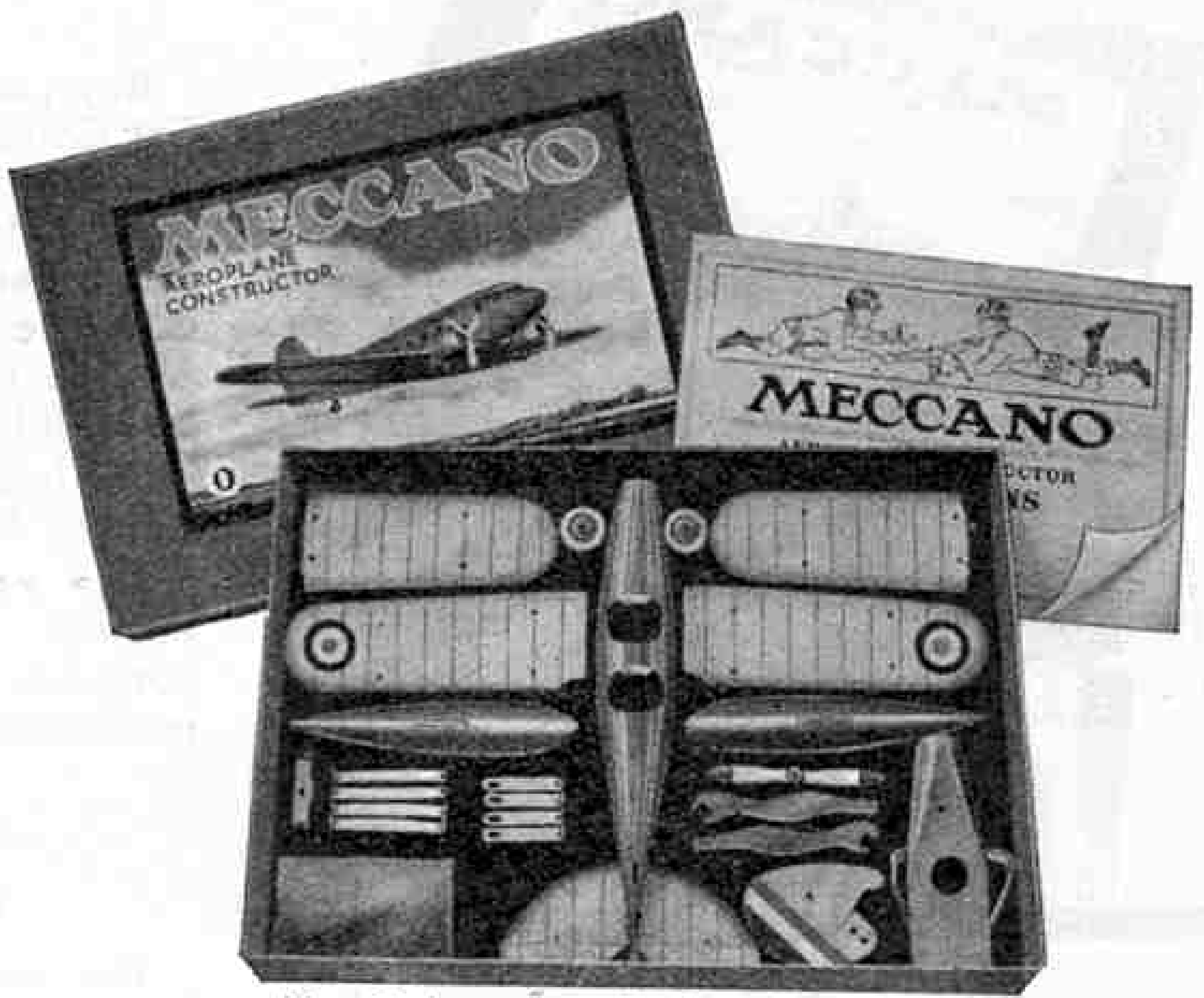
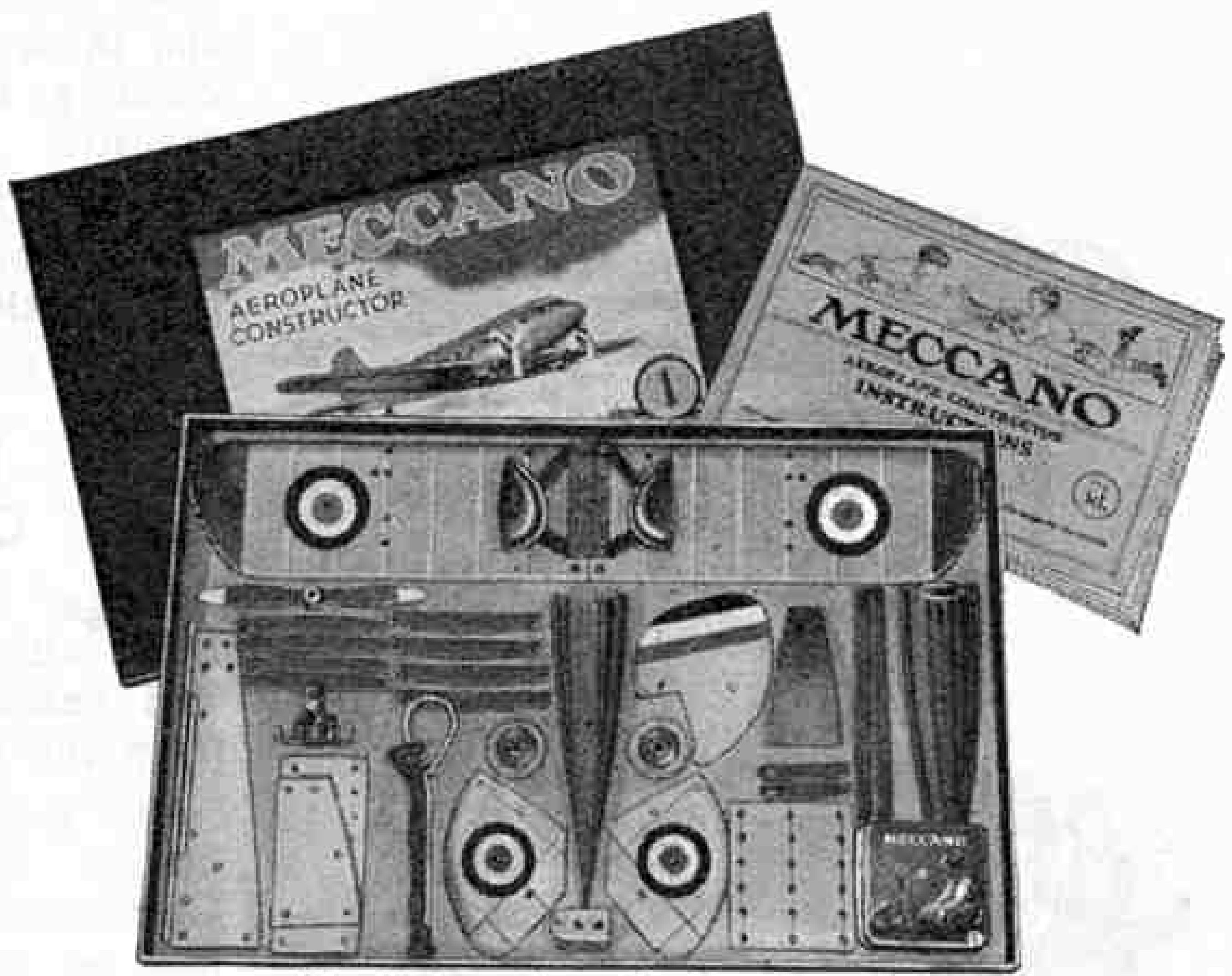


No. O Aeroplane Outfit. Price **4/6**



No. 1 Aeroplane Outfit. Price **7/6**

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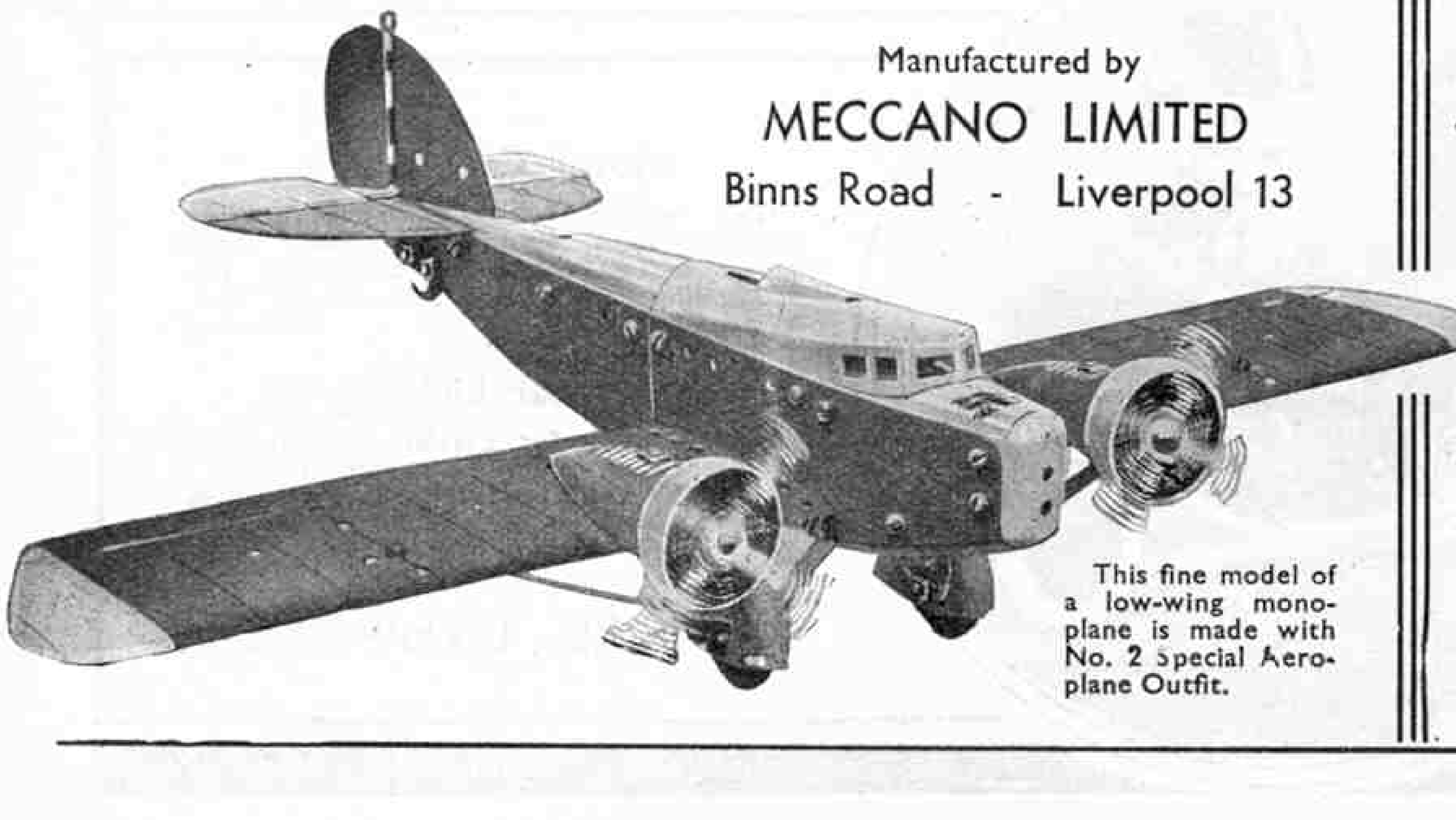
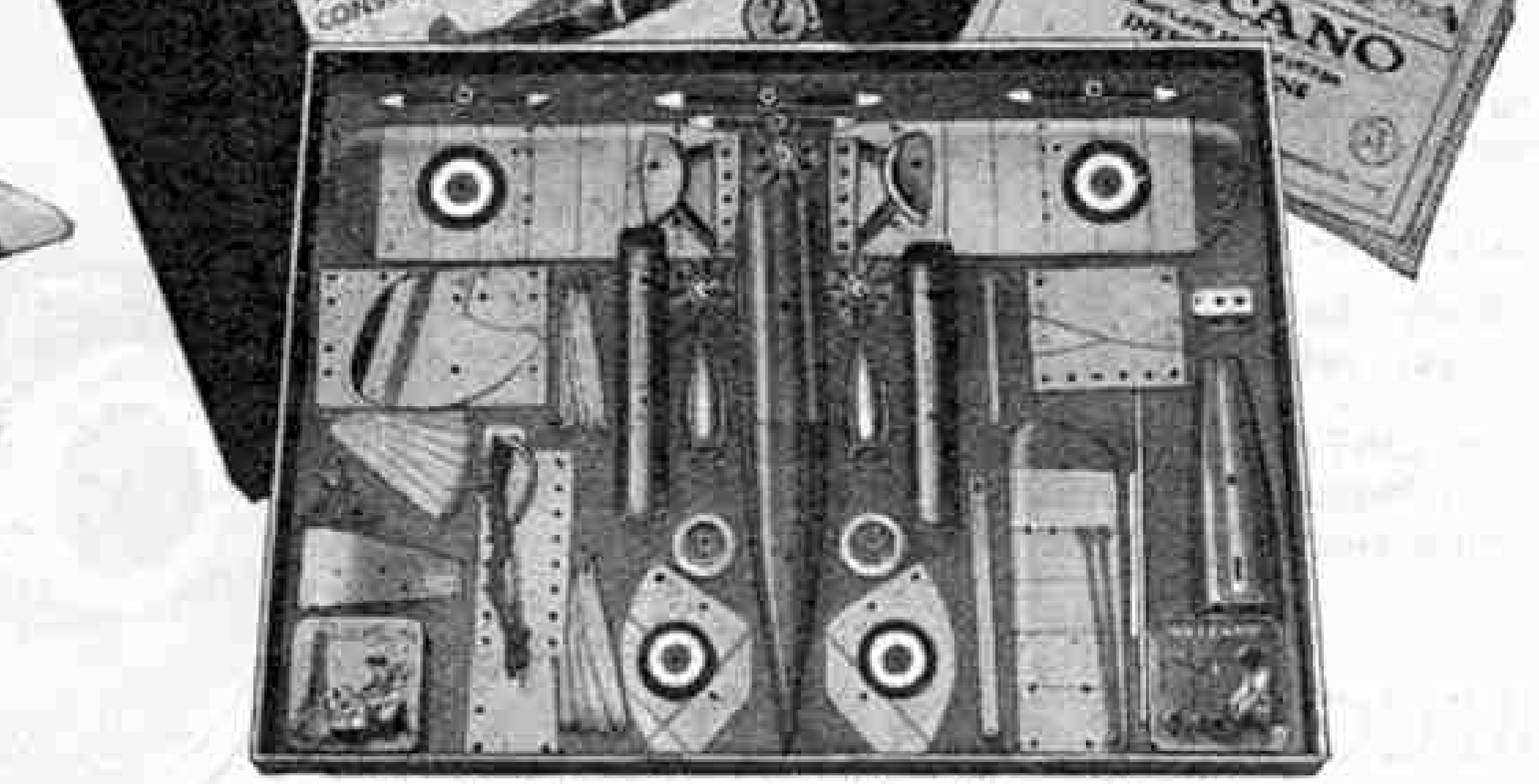


This fine model of a low-wing monoplane is made with No. 2 Special Aeroplane Outfit.



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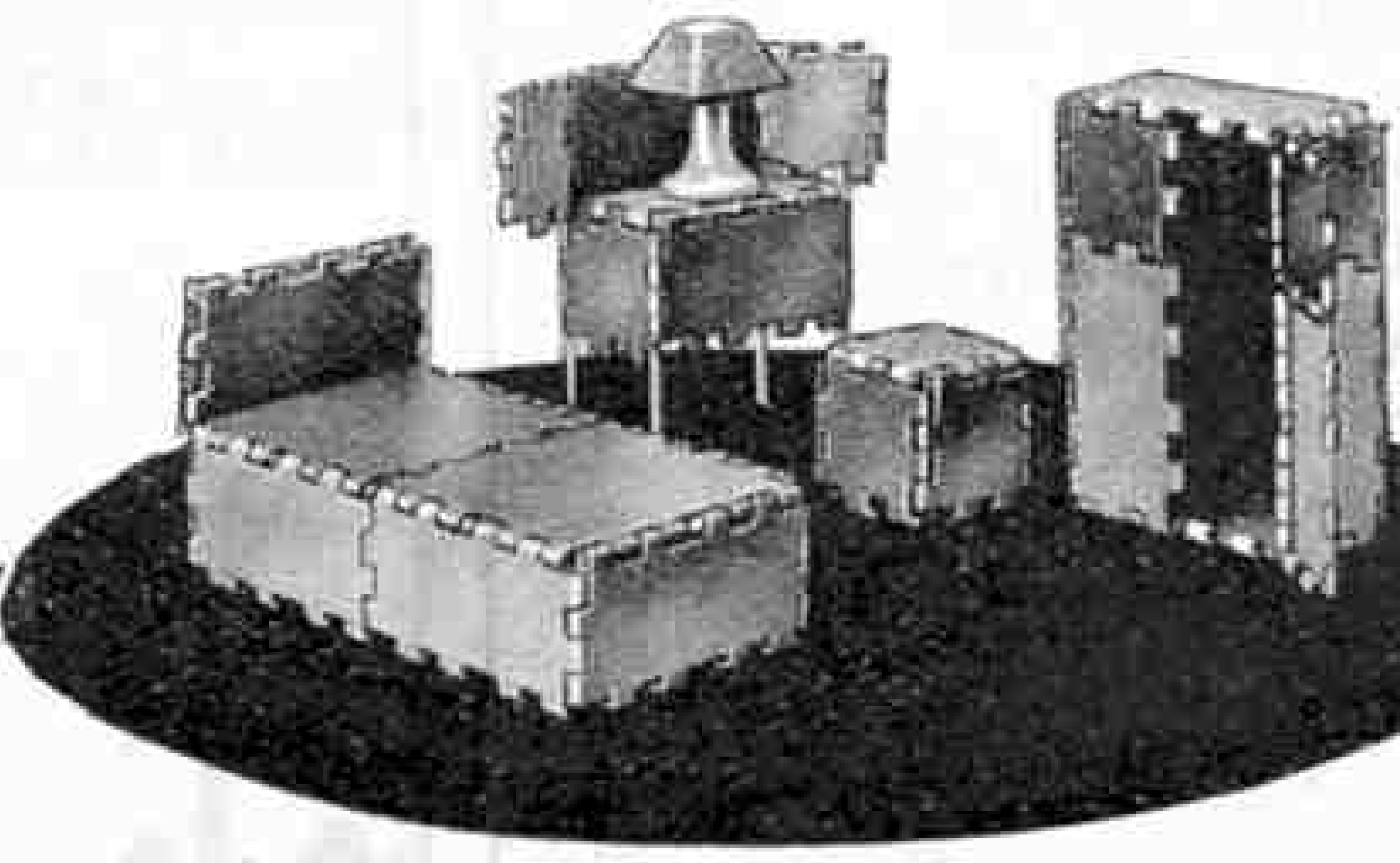

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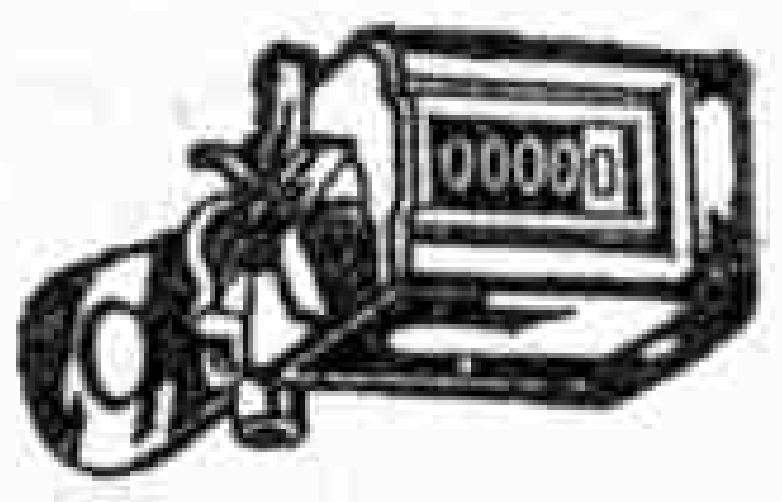

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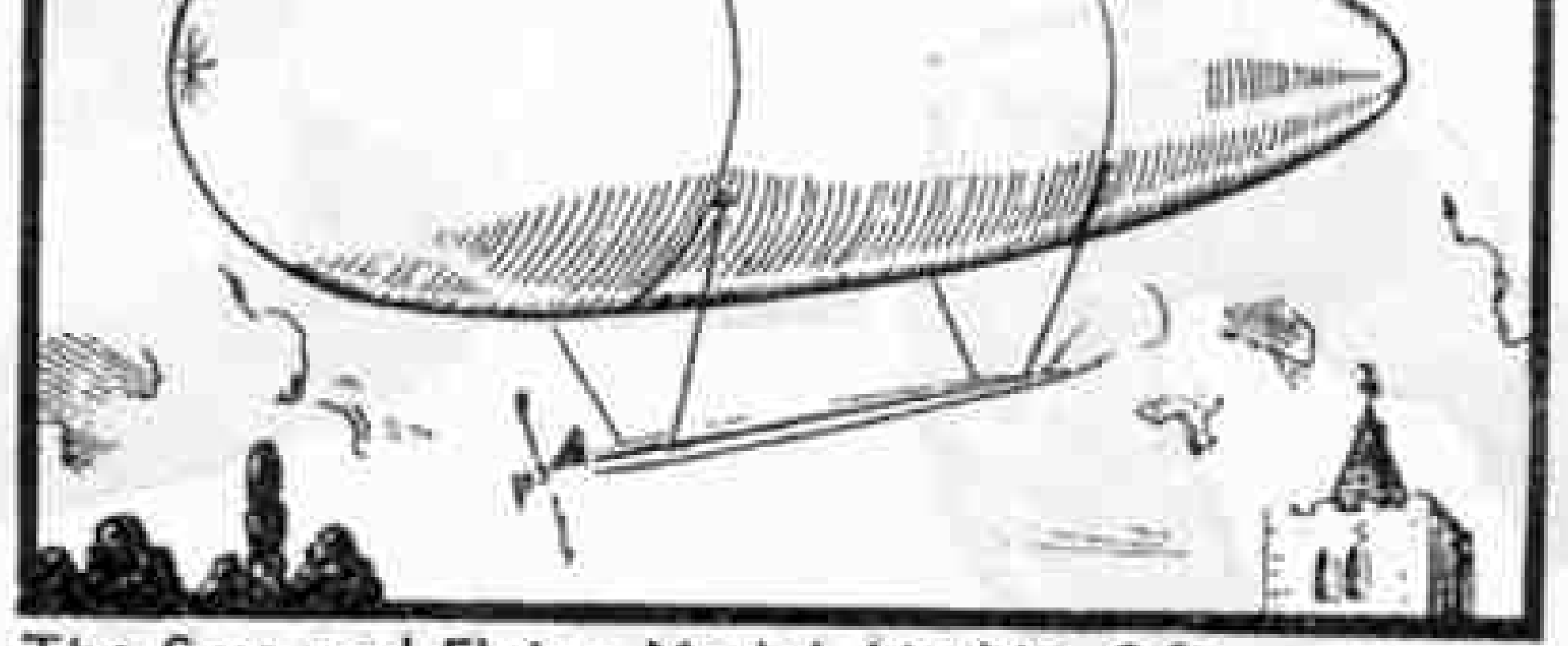

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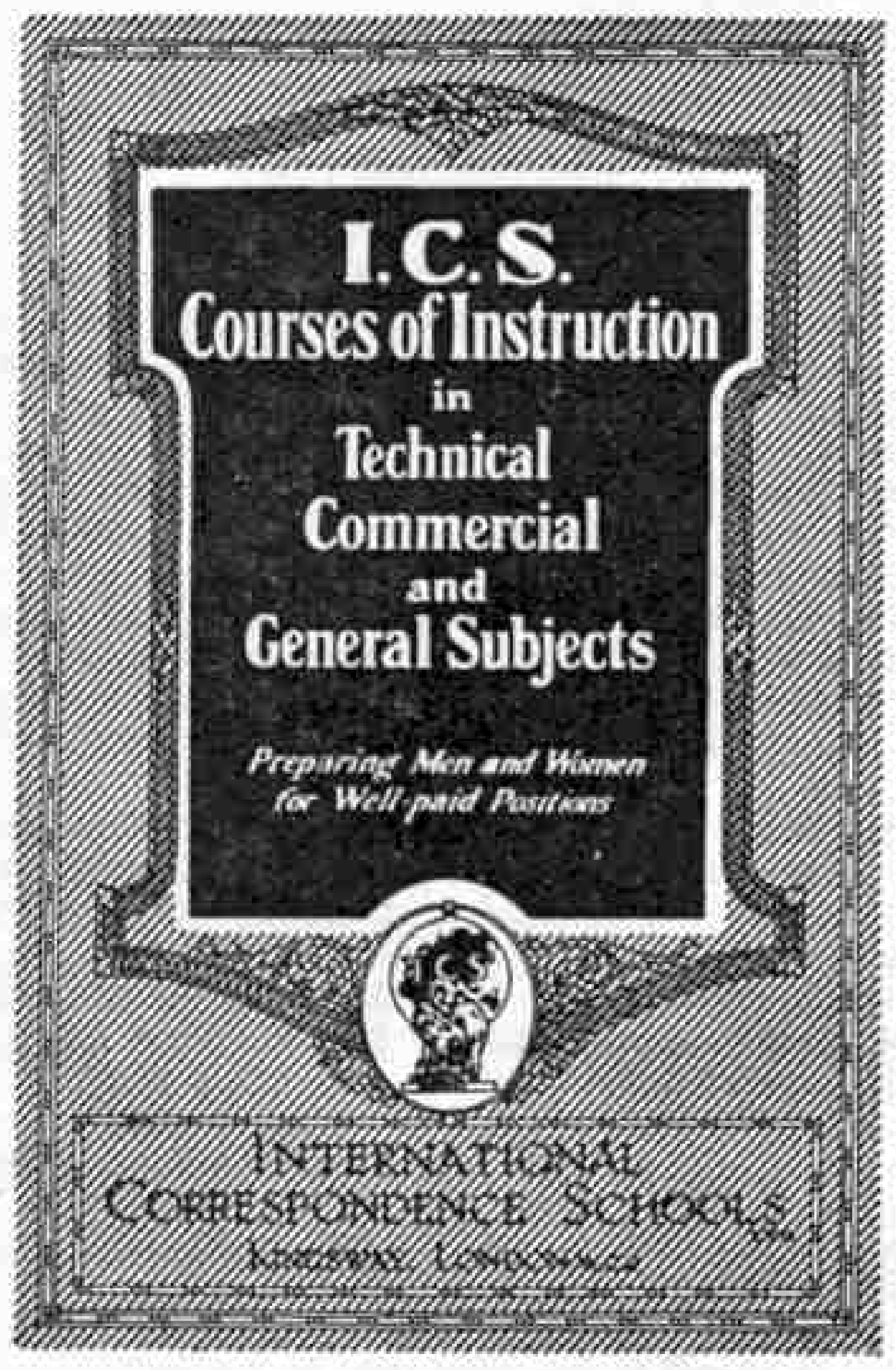

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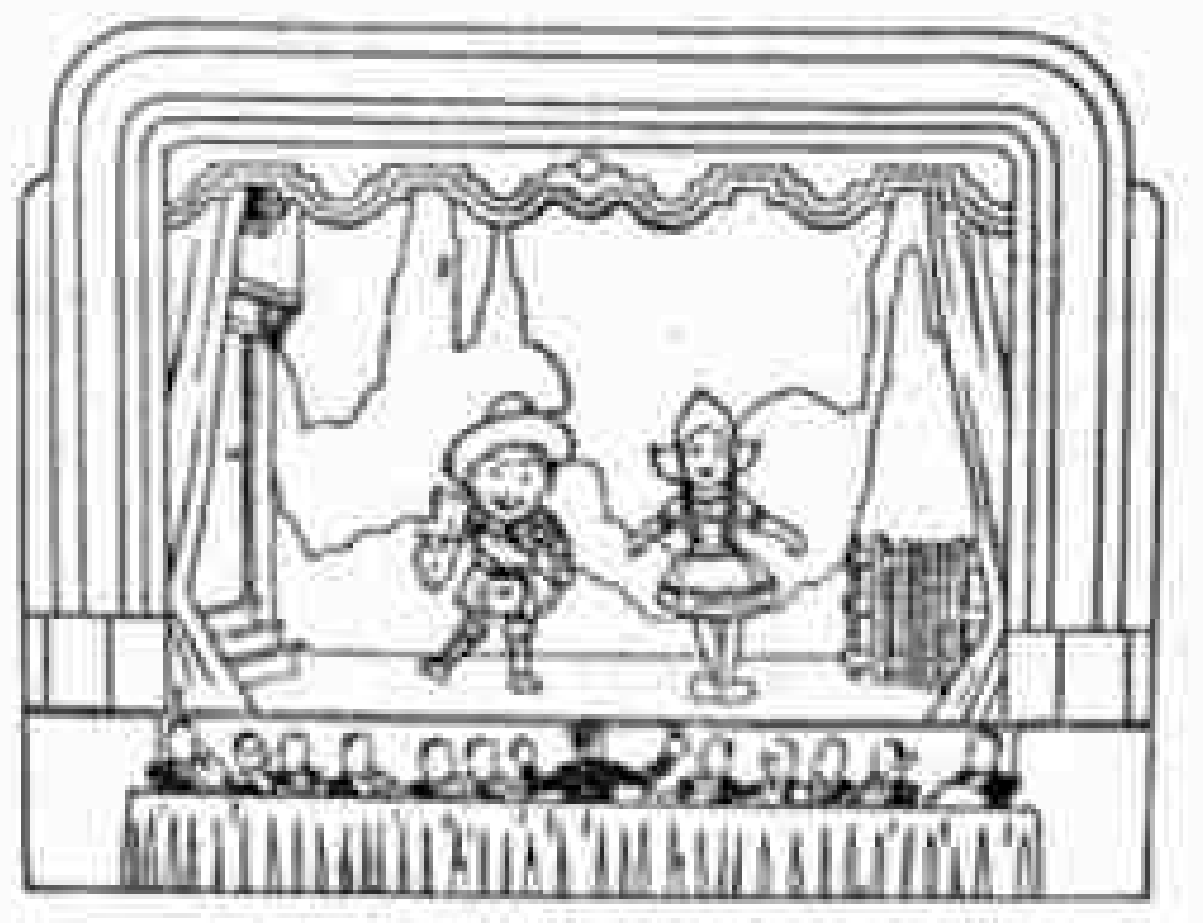

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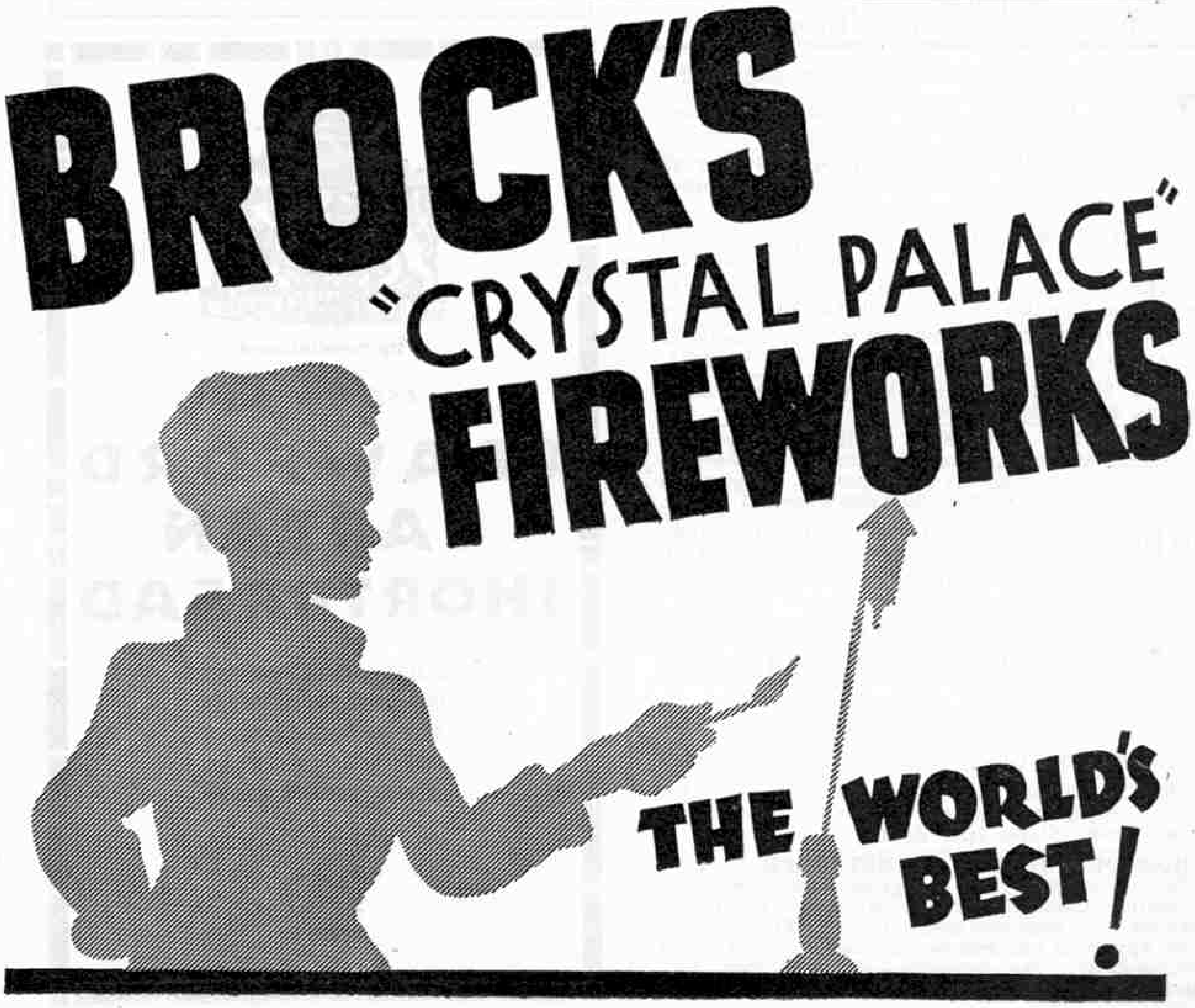
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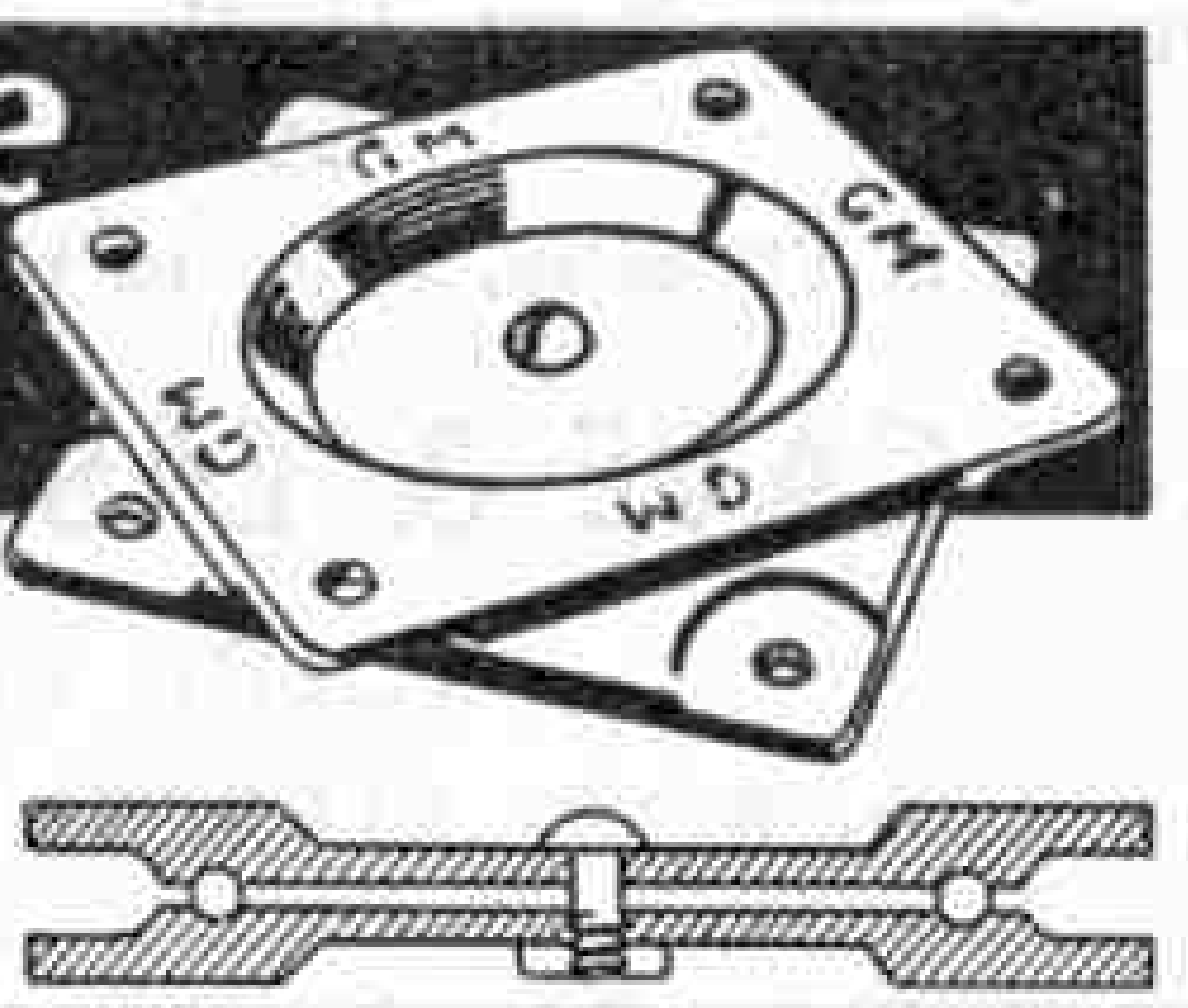

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Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

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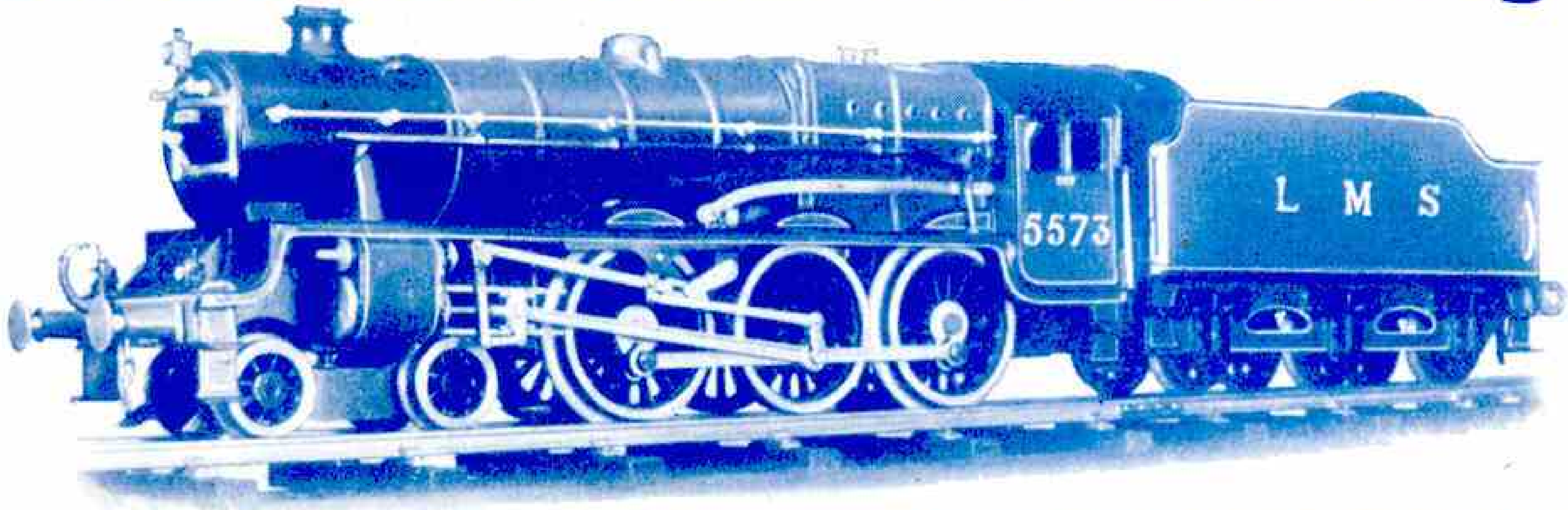

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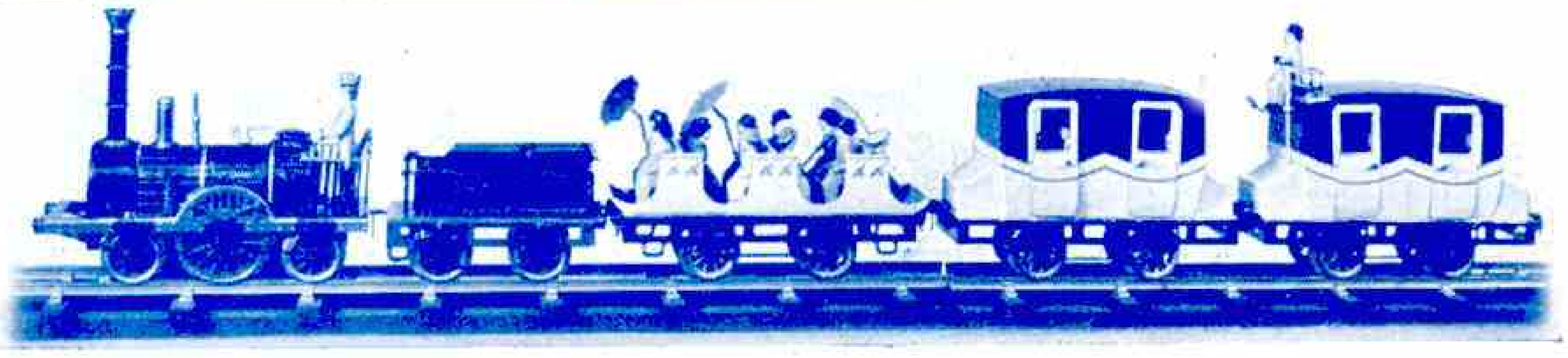

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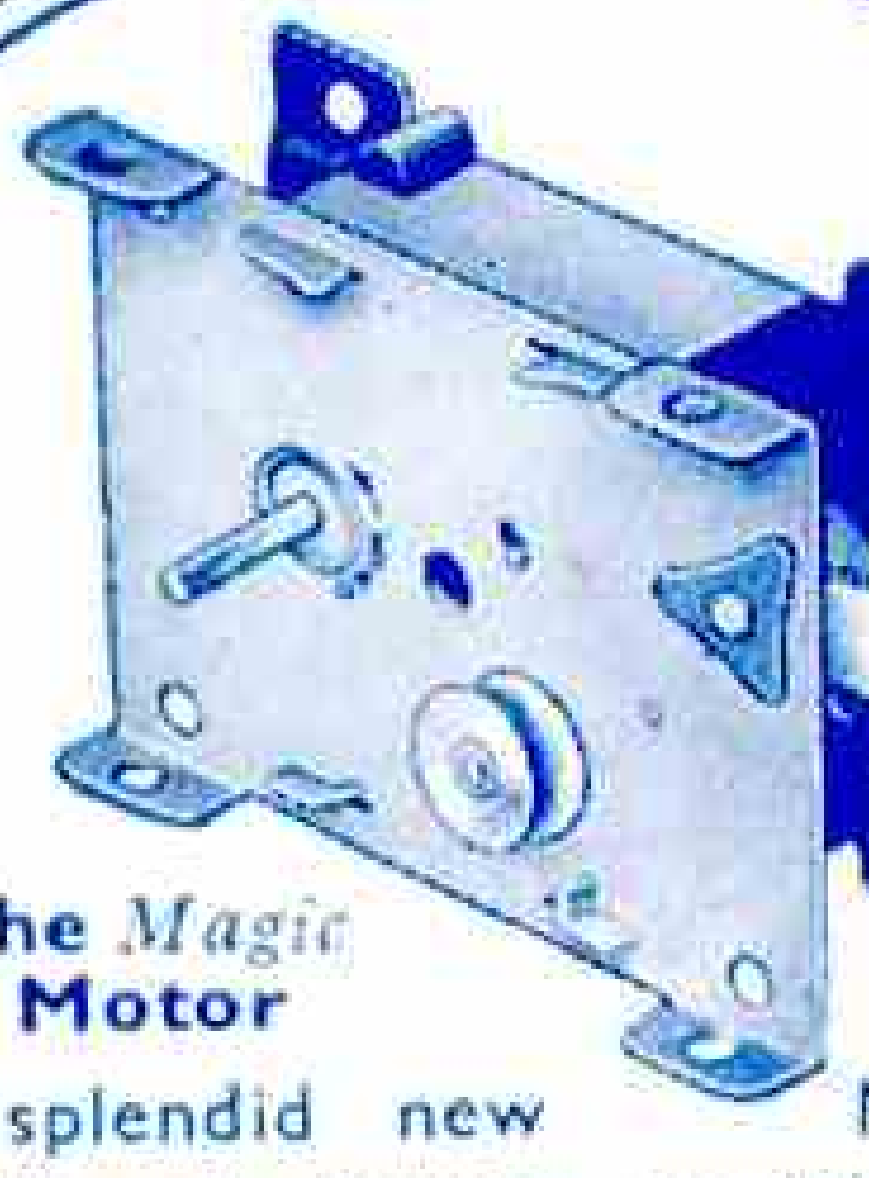

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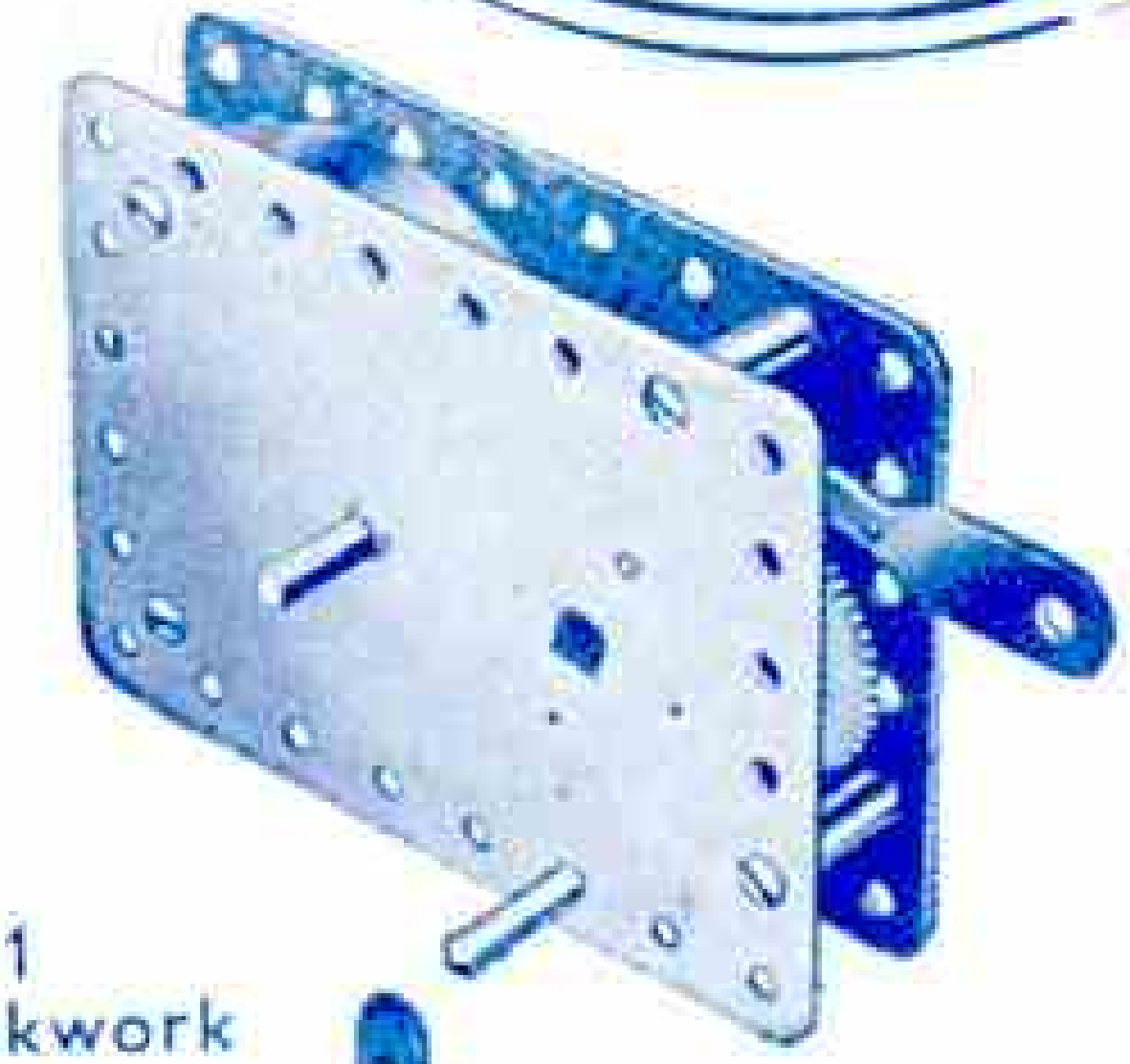

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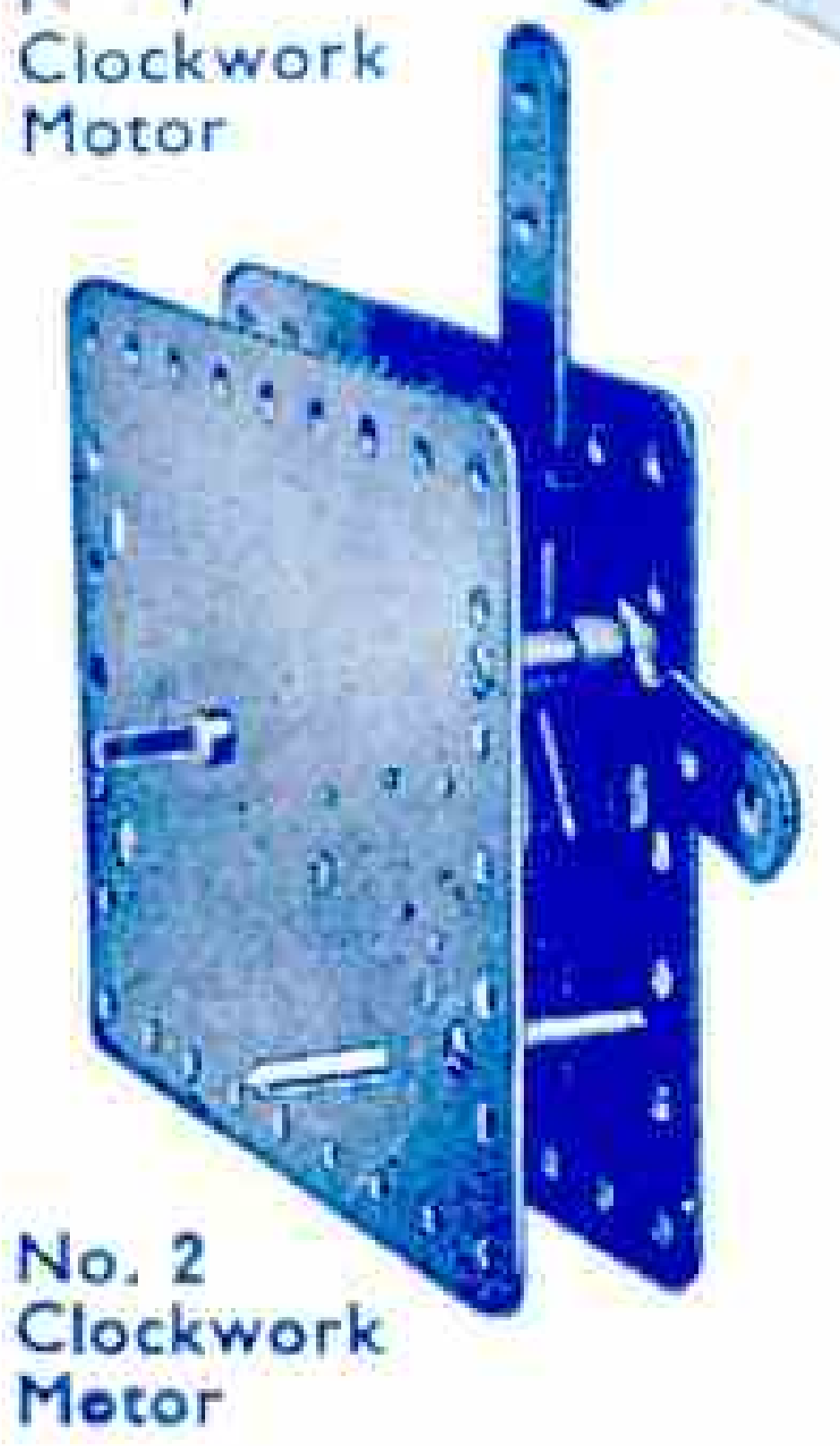
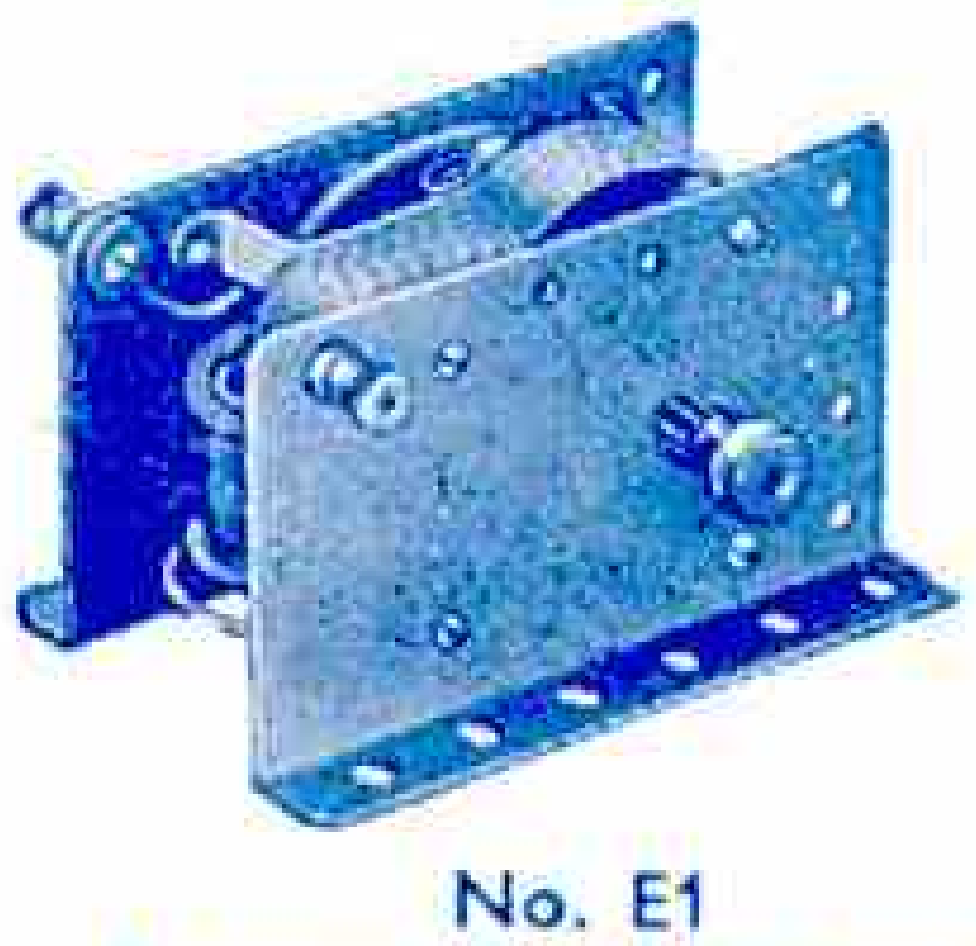


No. 2 Clockwork Motor



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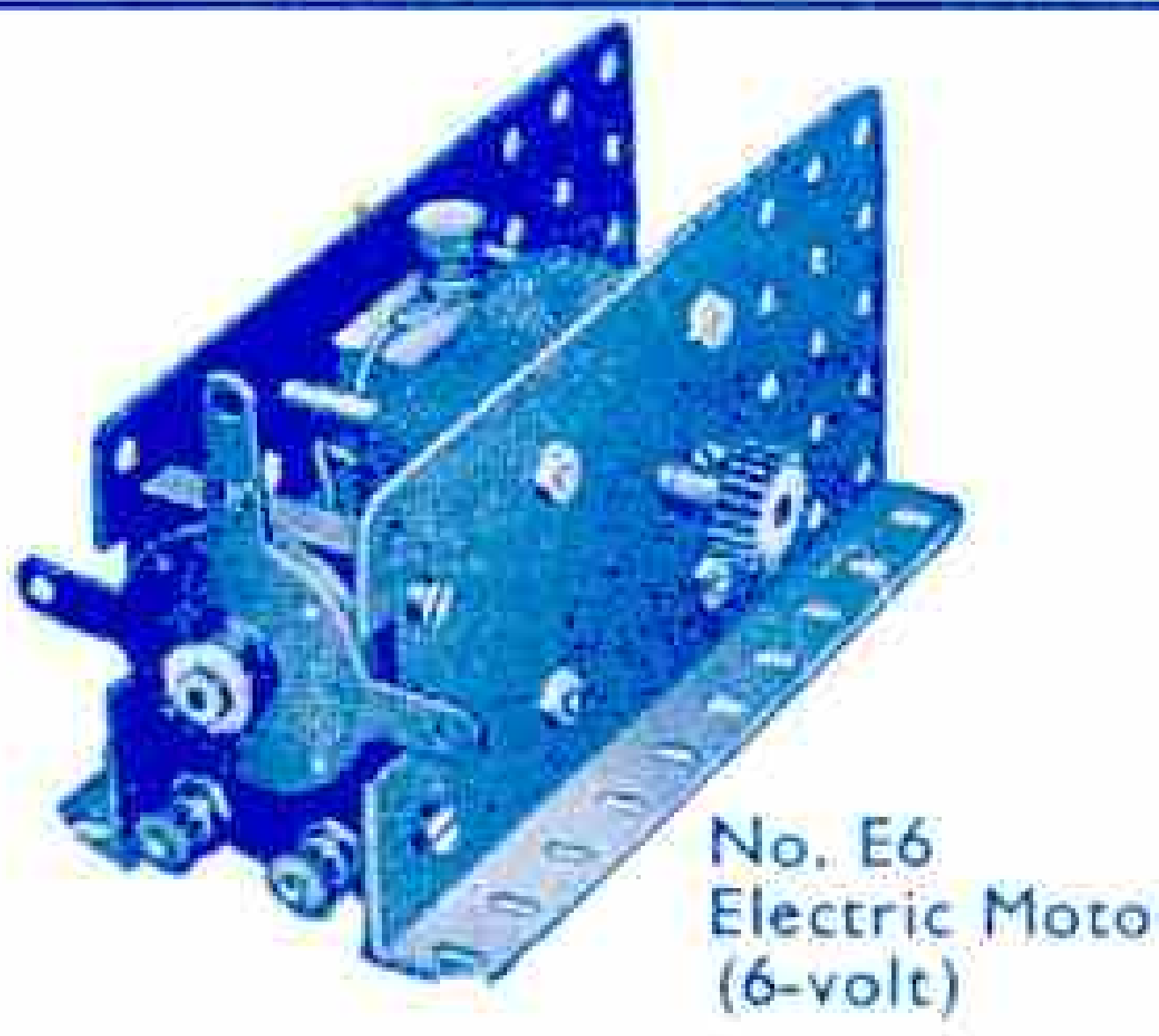

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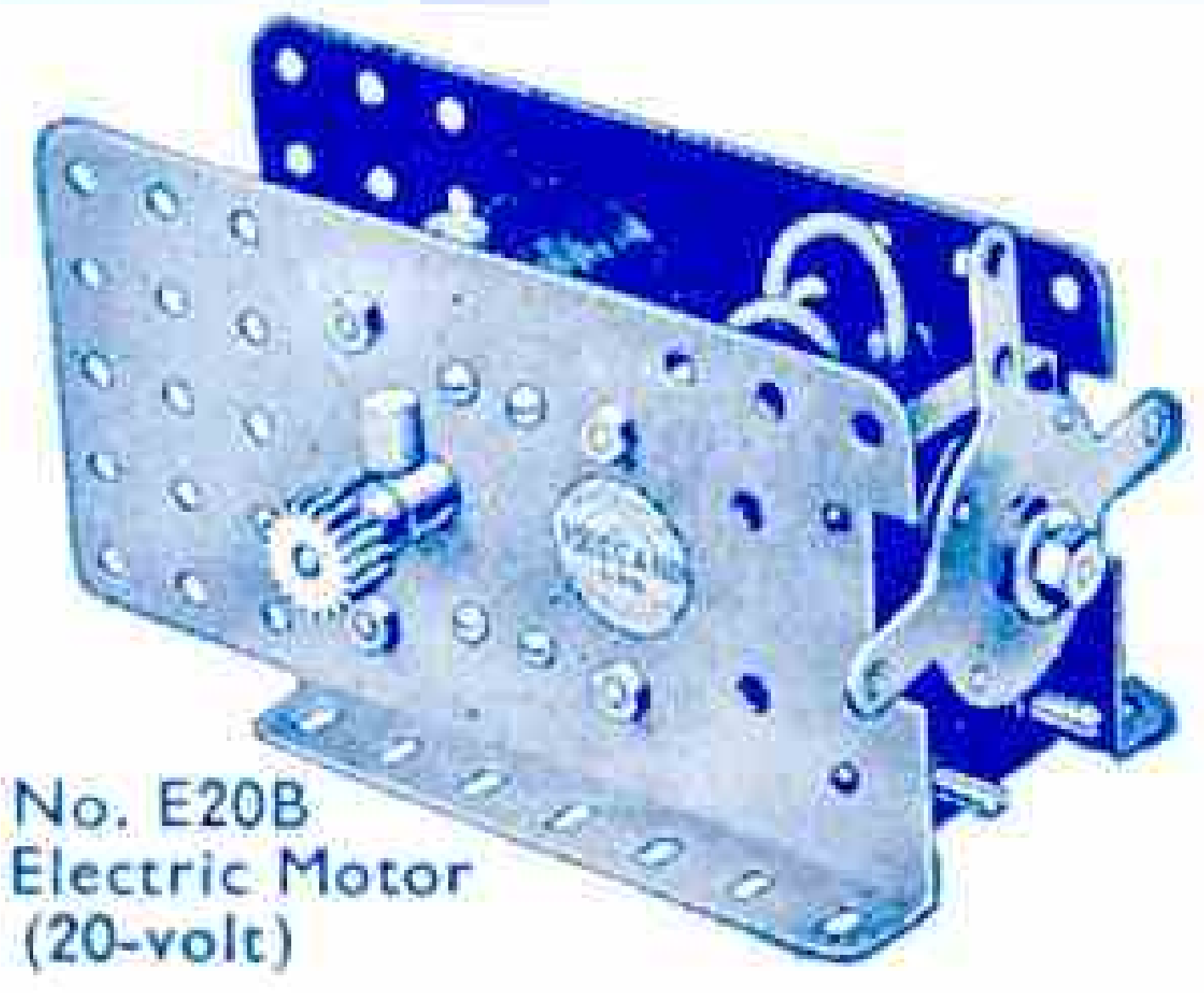

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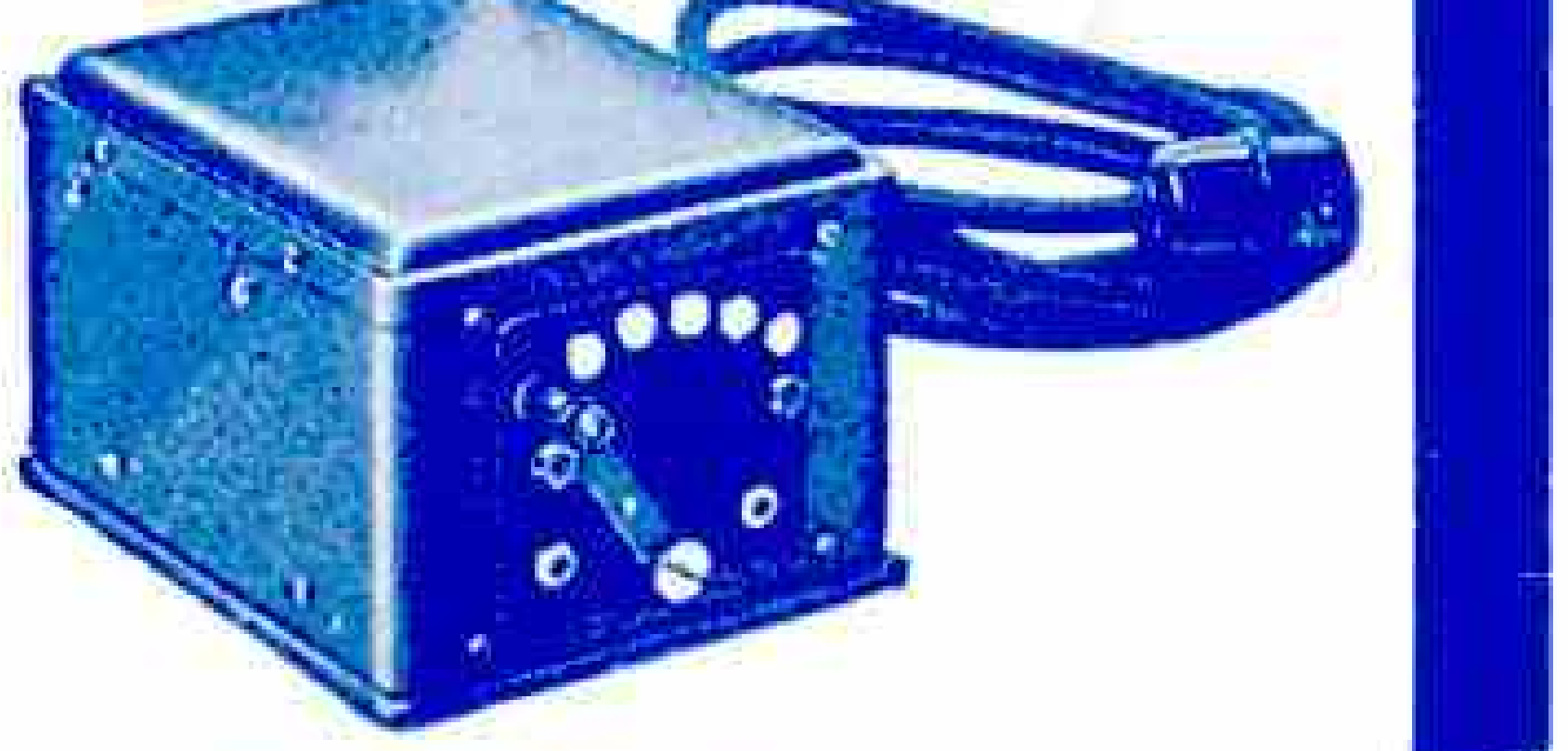

No. T20 Transformer

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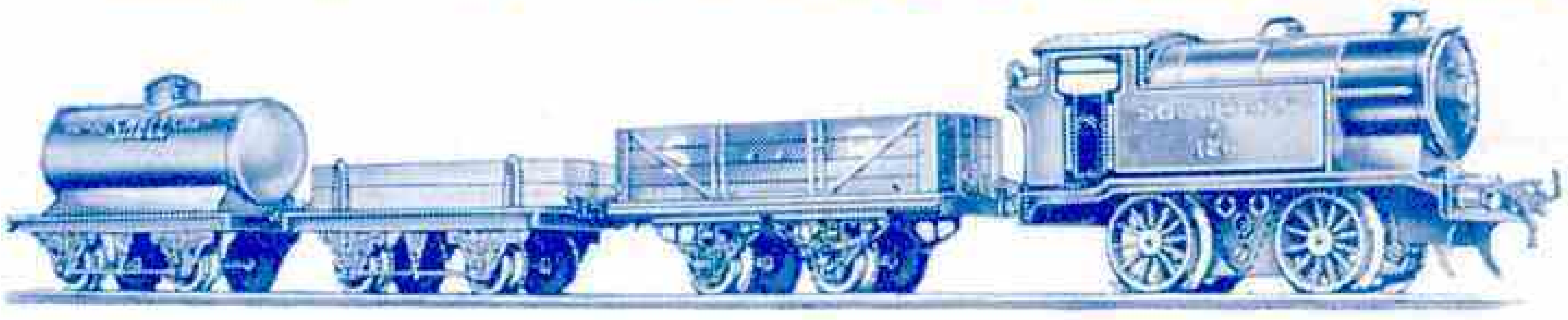

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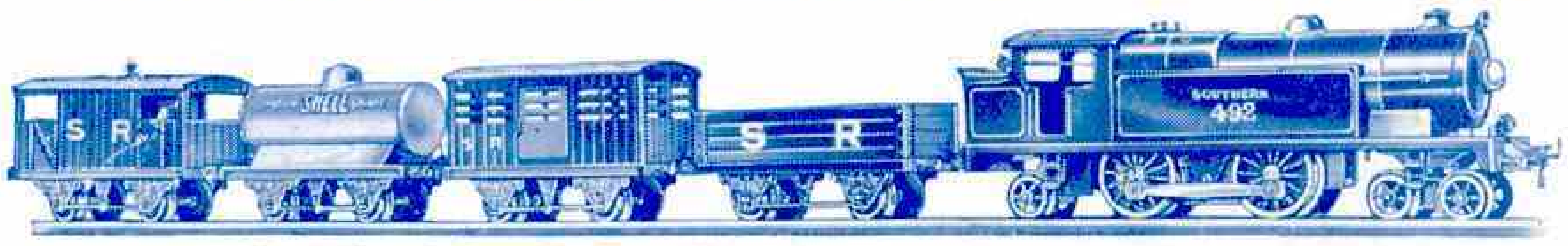

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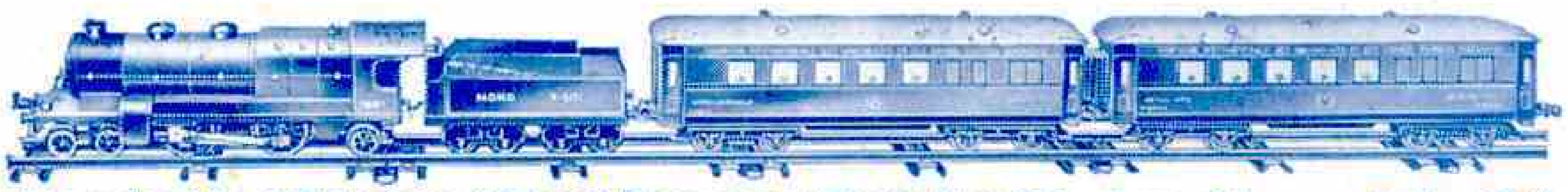
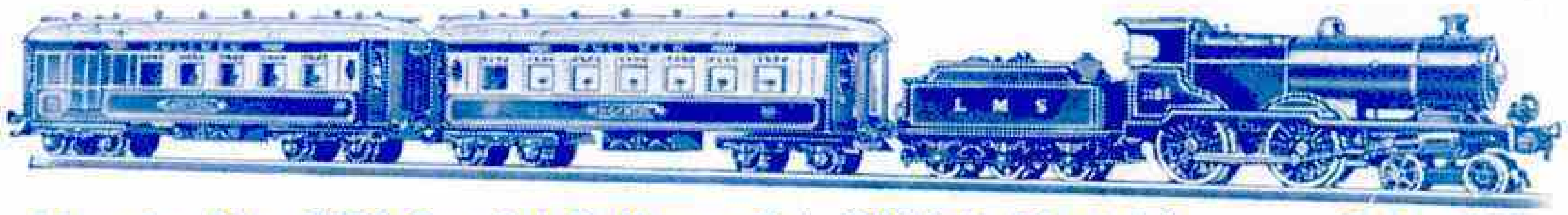


Hornby No. 3C Riviera "Blue" Passenger Train Set (Clockwork) ... Price 57/6



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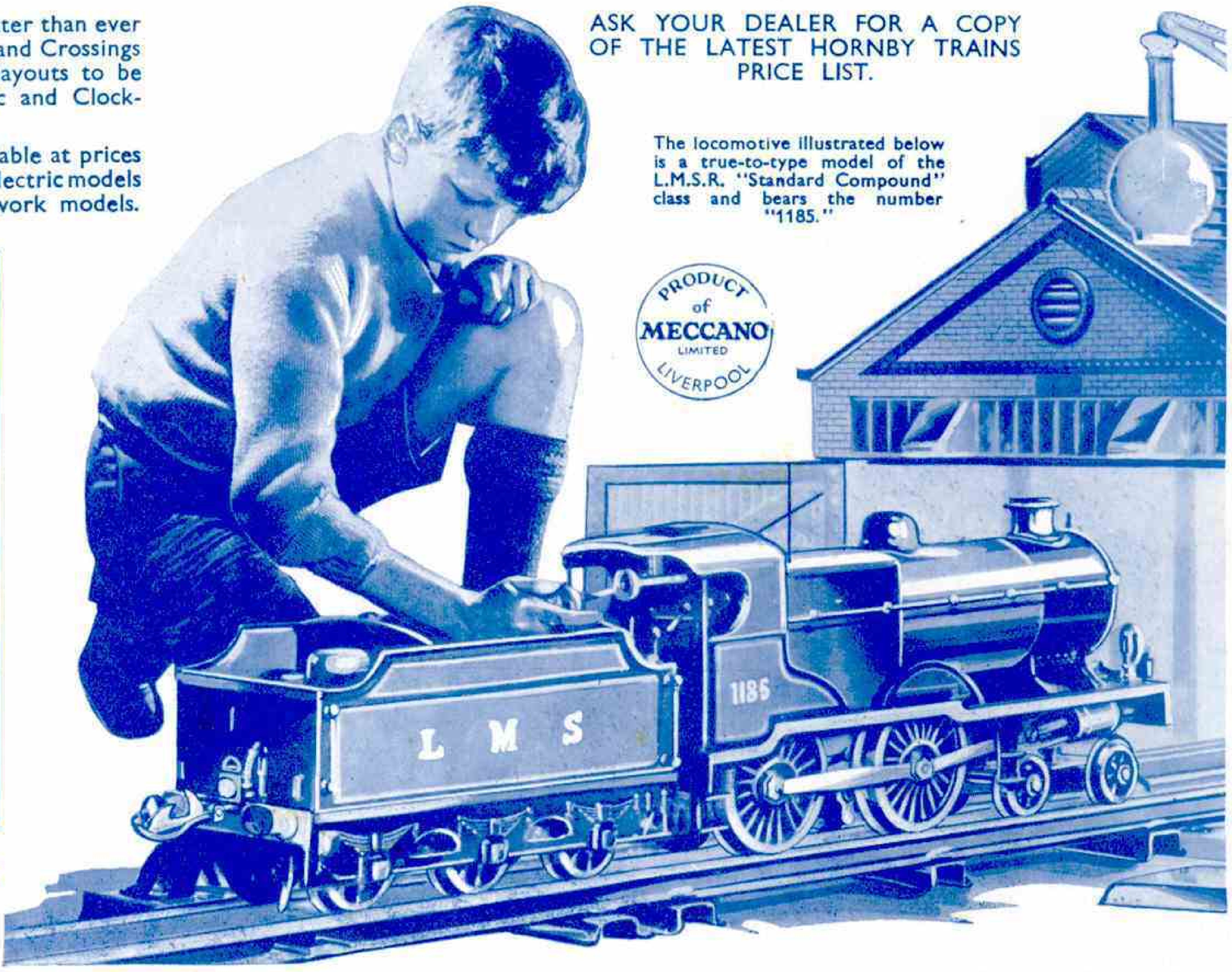
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